

# COMPUTERWORLD

## THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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## SE Contract Acceptance Related to Model

By Drake Lundell  
CW New York Bureau

NEW YORK — Only about one-third of the small IBM users have signed up for IBM systems engineering services, and most of the firms that have signed the general SE contract do not plan

to make much use of the services, a poll conducted by CW indicates.

The most commonly voiced complaint by 360/20, 360/30, 360/40 users contacted concerned the degradation of IBM services in "the new world," espe-

cially the loss of free education services.

More than 75 IBM users were contacted by CW on a random basis. Approximately 45 of these users answered detailed questions about the effect that unbundling has had on their operations. The users are almost even-

ly divided among the New York City, Los Angeles, and Boston areas.

Apparently 360/20 users have less need for the systems engineering services than either model 30 or 40 users. By more than two to one they said they had refused to sign the new agreement. There was an almost 40-60 split among 360/30 users, and an almost 50-50 split among 360/40 users.

A full 80% of the 360/20 users who have signed the contract said they signed "just to play it safe" and that they didn't expect to use the services much, if at all. Half of the model 30 users who signed indicated that they would not rely heavily on the service, and almost all of the model 40 users indicated that they were using the SE agreement as a stop-gap measure until they could train in-house personnel.

One conclusion drawn from

the lack of interest among the 360/20 users, and from interviews with respondents to the survey, is that many of the SE installations are running fairly set and prosaic programs and are not experiencing many problems. One user said: "We have not had to call on IBM SE services for over a year. Now that we have to pay for the services, you can bet we won't be calling on them for help."

No clear reason emerged as to why some installations have signed and plan to use the service. Apparently there has not been much comparison shopping to see what other services are available, according to the survey.

### Signing Justified

Reasons given for signing the contract ranged from "the SE is a friend of the boss and the boss used to work for IBM" to "we think that IBM is the only firm that can provide the services."

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## National Computer Year Planning Hurt by Afips and IEEE Apathy

NEW YORK — It appears that a squabble is growing among the various computer-related associations and organizations over the Association for Computing Machinery's proposal for a National Computer Year, and the split could possibly torpedo the effort before it is fully launched.

The National, possibly International, Computer Year was originally proposed in July by Robert Bemer, program chairman for ACM's 1970 National Conference. It has received support from between 50 to 75 professional societies, according to ACM [CW, Feb. 11].

However, CW has learned that two influential societies in the computer field, the American Federation of Information Processing Societies and the IEEE Computer Group, are withholding their support from the project and will not take part in the planned computer year coordinating conference, which will be held in either late March or early April.

The ACM organizers of the project told CW that Afips was one of the first organizations contacted for support of the project when it was formulated last July. The group, however,

rebuffed the ACM effort at a meeting of its executive committee in August.

An Afips spokesman told CW that the executive committee rejected the idea because it felt that there was not enough time to implement the idea by 1970, which was originally proposed for the start of the National Computer Year. However, ACM sources indicate that Afips has not shown any interest in the idea even after it was made an open-ended project without any set starting or ending date.

ACM sources said that Afips was welcome to participate, even at this late date, and that if it joined the coordinating committee it could ask for delays in the project for more time to plan, if that is its real objection.

Some ACM sources, in fact, see the time factor as a dodge on the part of Afips, and accuse the society of wanting to take over the project.

"Afips really likes the idea," one source told CW, "but they want to run it and have everyone follow after them. They don't want to participate now because they wouldn't be able to run it, they would have only one vote like the other societies."

The attitude of the IEEE Computer Group seems to support this last contention of the ACM. The group, in correspondence with ACM, announced that it would not support the project, unless it was run by Afips.

While the overall IEEE group will not support the project at the present time, the organization's New York City chapter

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## COMP-O-MIDWEST SHOW OPENS, HEAVY USER INTEREST EXPECTED

CHICAGO — More than 76% of the visitors at the recent Compso-East show owned a computer or used some type of computer service. It appears that users will also dominate the Compso-Midwest show at the Palmer House Hotel in Chicago Feb. 17-19.

In addition to the heavy concentration of users at the Compso-East conclave, the quality of the visitors can be described as "top-drawer," with an even 80% of the more than 7,500 registrants coming from the ranks of corporate top and middle man-

agement personnel.

The figures on attendance at Compso-East were developed by PDA Systems Inc., New York City, under contract with Show World Inc., the division of Computer Expositions Inc. which sponsored the show. PDA will also provide a breakdown of the registrants at the Chicago show and at the Los Angeles show on April 7-9.

Almost 40% of the visitors to Compso-East already own their own computers, according to the figures. Approximately 18% use time-sharing and another 18%

were tied in with service bureaus.

Nearly 10% came from firms that are currently considering their first computer purchase. Another 10% said they were considering either time-sharing services or service bureaus to handle their data processing needs.

Other statistics now available from the Compso-East show indicate that 27.5% of the visitors were corporate officers with such titles as president, vice-president, chairman of the

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## Just Like Pictures From Mars

## 360s Can Use 35mm Film For I/O

By Frank Piasta

CW Staff Writer

GAITHERSBURG, Md. — An

### On the Inside

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Computers Help Detect Signs of Lung Disease

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I/O device for the IBM 360, that can read as well as write 35mm photographic film, is IBM's first computer output to microfilm product.

The IBM 4481 Film Reader Recorder, introduced last week, is said to speed the transfer of illustrations, photographs, and other graphics data from film to a 360. The unit can also reverse the process and record the data in its original form on film.

The 4481 is not a conventional reading device in that it is not a character recognition unit. It, instead, could be described as a duplicator. A parallel could be drawn with the devices, used to transmit pictures of Mars to earth by digitizing the images and then reconstructing them.

The IBM 4481 will operate with Models 30, 40, 44 and 50 of the 360 series.

In the 4481 input output unit, a cathode ray tube directs light through a lens at a one-inch square of transparency or unexposed film. The beam can be directed at any of 16.7 million points — a 4,096 by 4,096 matrix.

When reading, the 4481 senses the amount of light transmitted through the film by a photo multiplier tube. Intensity is ranked against a scale of 64 values. The computer records both the intensity and position of each point scanned, thereby converting the transparency to digital information.

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From a previous photograph of the model, IBM's new 4481 film reader recorder sent a digital image to the IBM/360. The computer in turn printed the view it had of the model. The new machine can transfer information to and from 35 mm film.

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## Bema Combines Standards Push for X3, X4

By Edward J. Bride

CW Staff Writer

NEW YORK — Computers and office machines, once thought to live in two different worlds, are finally being recognized as compatible and perhaps even complementary by a group of manufacturers.

The group is the Business Equipment Manufacturers Association (Bema), and the recognition comes in Bema's recent combination of the standards efforts for computers and office machines under one director of standards.

The American National Standards Institute (Ansi) committees X3, Computers and Information Processing, and X4, Office Machines, will receive administrative support and direction from Bema's new Standards

Department, which will report directly to Bema President C. Mathews Dick Jr. New director of standards will be Vico E. Henriques, formerly associated with Bema as director of data processing standards in the mid-sixties, and presently a director of Arthur Young and Co.

In announcing the restructuring, Dick said that Bema "recognizes the close inter-relationship of many" data processing and office machine standards projects.

Dick added that Bema places "high importance" on the standards function.

## NBS Official Agrees

Commenting on the announcement, Dr. H.R.J. Grosch, director of the National Bureau of Standards' computer center, said

it "promotes the natural unity of the standards business across large and small equipment."

He added that the recognition of commonality of interests in the data processing and office machine groups was a fortunate occurrence.

Formerly, administrative support and direction for X3 and X4 was provided separately by Bema's data processing and office machine groups.

These two groups will continue to provide policy direction, technical guidance and financial support to the Bema Standards Department within their respective areas of interest.

## Will Replace Grove

Henriques fills the vacancy left by the death last fall of Alexander C. Grove, vice-chairman of

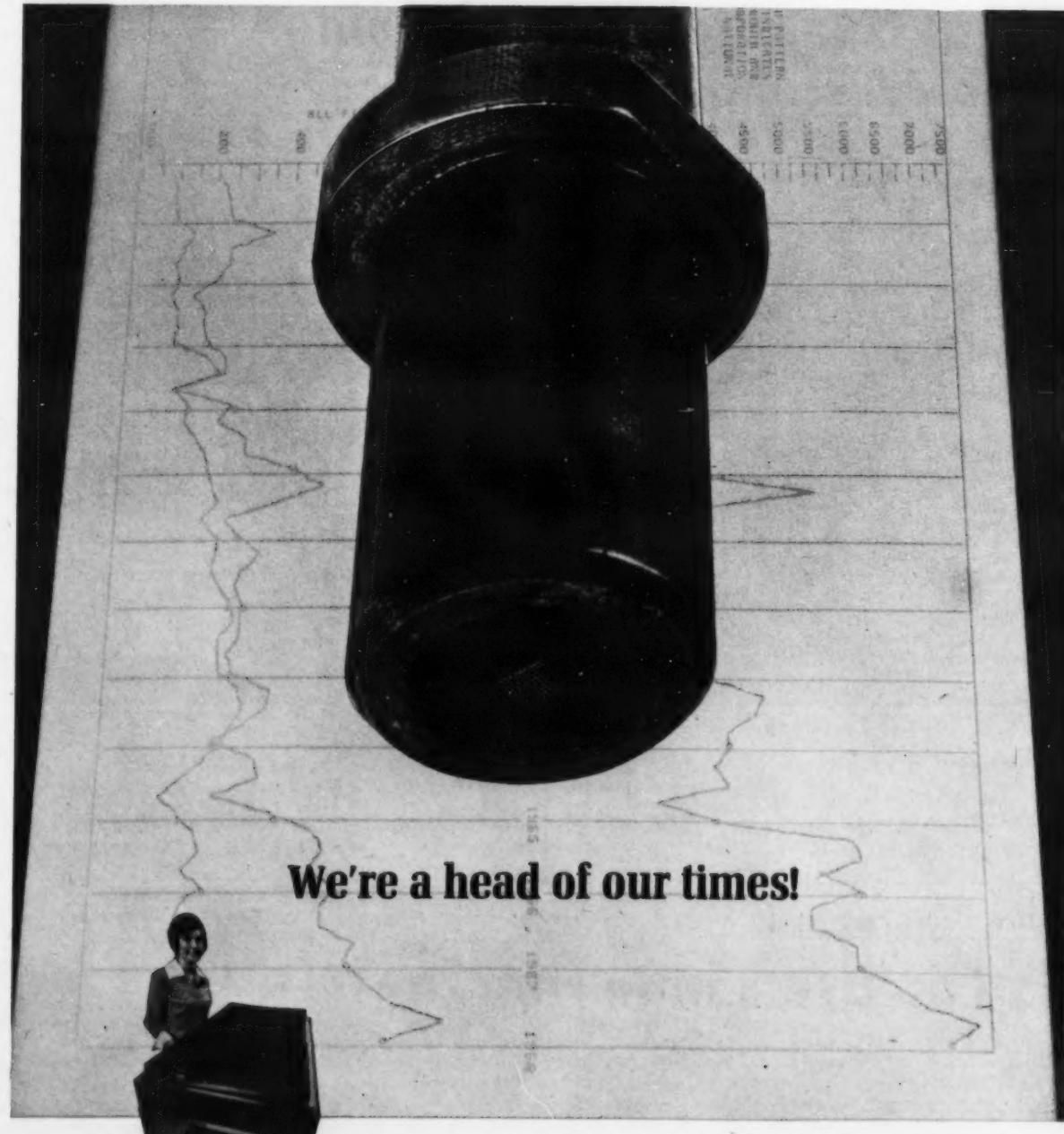
Ansi's X3 and director of Bema data processing standards [CW, Dec. 3].

Bema spokesman Paul Notari said that Henriques was sought for the position because of his past experience and concern with data processing standards.

Notari singled out keyboard design as one area in which data processing and office machines share a keen interest in standardization.

The new department will also provide support for the Ansi counterpart in the international standards programs of ISO TC/97, Computers and Information Processing and ISO TC/95, Office Machines.

Henriques will take office on April 1.



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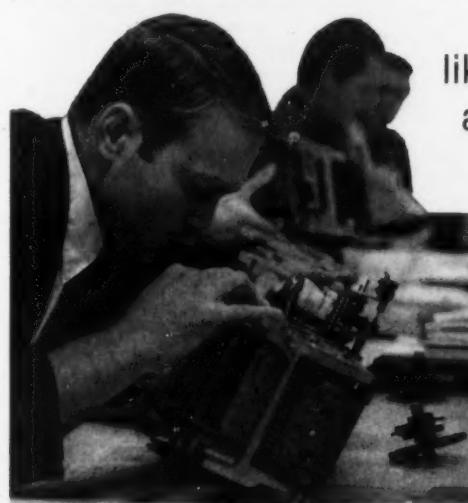
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humming away, getting the work out. Un glamorous, uncomplicated, and inexpensive. So inexpensive, that it's possible, for the price of one hour's

computer time, to rent a small unit record combination for a whole month.

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and at great savings. Bog a computer down with a lot of raw data and you're likely to bog down your profit and loss statement as well.

Then there are things like computer editing and back-up. Not exactly the stuff of tomorrow's headlines, but not to be ignored either. Especially when the auditors are hanging around.

In the salons of technology they twitter about the new computers, and sometimes we do, too. But all those workaday calculating tasks keep piling up, problems in search of an economical solution. That's why all those punched card machines are still around. Along with all those well trained men to care for them. You need good men in a vanishing business.



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# SE Contract Acceptance by Users Related to Model

(Continued from Page 1)

This last installation admitted that it had not looked at any other services, and didn't know of any that were available.

There does seem to be some general trend among those firms that chose not to sign "on the dotted line." The vast majority of these installations hope to be able to replace the previously free SE services with in-house personnel, with only occasional reliance on outside consultants.

This group also felt, in general, that the IBM services were not worth the prices being charged. One of the users spoke for over 60% of the nonsigners when he said: "The IBM SE assistance was mediocre even when it was free, and since the company won't even guarantee results un-

der the new system, it's worse now."

Many of the firms signing the new SE agreement reflected this attitude of the nonsigners. One installation, which called IBM, "the best choice in an unsatisfactory environment," admitted that it had signed the contract just for a six-month test, after which it expected to have in-house capability.

An interesting sidelight on doing business in the computer industry came from the consulting firms contacted in the limited survey. Of the firms interviewed, all admitted that they had signed the SE agreement in order to see what IBM was offering for the price so they could develop methods of competing in this area. From their re-

sponses, it appears likely that several firms are studying the IBM SE setup and can be expected to enter the services business shortly.

Most (almost 90%) of the users felt that unbundling was going to increase their data processing costs, but said there was no clear evidence of the amount of the increase. Estimates ranged anywhere from a 3% increase to a 25% increase, with most of the responses falling close to 10%.

A majority of the installations, however, felt that they would be able to operate more efficiently in the unbundled environment in the long run, even though costs would be up. One user who has both a model 30 and a model 40 said that at first it would be harder to operate efficiently in the new world, but "eventually

when we become more adept at evaluating the alternative services available, I think that overall efficiency will increase. It may be harder on the data processing manager and not as convenient as the bundled world, but we should receive more for the money spent."

While most of the users contacted admitted that increased costs were their major objection to unbundling, many felt that the loss of education services, the annoyance caused by unbundling, and the loss of "faith" in IBM were of equal importance.

Well over 75% of those contacted felt that the loss of IBM education as a free service was objectionable. It appears that many of the users in this group have taken advantage of the course offered by IBM in the past but will have to cut back on them now that they carry a price tag.

"Before, when I had some free time," one center manager admitted, "I would sign up for one of the IBM courses as sort of a self-improvement program. Now it will be hard to convince my boss that he should give me time off from the office and at the same time pay a couple of hundred dollars just for me to improve myself."

At the same time several of

the users said they hoped that this move would force IBM to improve the courses offered. "This should help the quality of IBM education," one said, "because I am sure that we and other installations will now evaluate education courses offered by independent firms in addition to those offered by IBM."

Again a large majority of the interviewed installations felt that the unbundling would cause them a great deal of annoyance and inconvenience. "Before, if we wanted a manual or some other service," one said, "we'd just call and it would be there. Now it appears that we will have to negotiate for almost all services."

Another user expressed annoyance at the fact that the user will have to go to each new IBM software release within 30 days, since only the latest releases will be supported by the firm.

A few of the more philosophical users said that unbundling had caused a loss of faith in IBM. "Many of us," one said, "paid for these services in good faith when we bought our equipment. It now seems that IBM, in what can only be called bad faith, is now turning around and charging us for those same services. If I ever try to charge my customers twice for the same service, you can bet they will scream."

## 1130 Gains More Random Access Using Plug-to-Plug Peripheral

By Frank Pista

CW Staff Writer

SANTA CLARA, Calif. — A plug-to-plug compatible disk system for the IBM 1130, offering up to five times the storage capacity and 10 times faster access than the IBM 2310 drive, was announced by Memorex last week.

The Model 3610 disk storage system features a 2.56-million 16-bit word storage capacity at a price that is about 20% lower than an equivalent amount of 2310 storage, according to the firm.

The storage medium is a 6-disk file with 10 recording surfaces. The average access time of 50 msec, as compared to an average time of 520 msec for the IBM

2310, is said by Memorex product manager Robert Daniel to significantly reduce compile, assembly and sort times, on the 1130 system.

The 1130 computer requires no reprogramming when the 2310 disk file is replaced by the Memorex 3610, Daniel said. The 3610 interfaces directly with the computer on its SAC (Storage Access Channel), or with an IBM 1133 multiplexer on the SAC II channel, he continued.

Memorex claims greater reliability and reduced maintenance time of the new disk storage system. This is due to the use of a linear motor actuator in place of more conventional hydraulic systems. This mechanism has been proven on more than 1,000

Memorex disk drives delivered to users, Memorex said.

The 3610 disk control unit is built into the storage device offering the user, according to Memorex, a smaller machine taking up less floor space than comparable IBM equipment.

Memorex maintains field service offices across the nation and abroad for response to use maintenance requests, Memorex said.

The 3610 disk storage system has been priced at \$750/month. This price, according to Memorex, includes the control unit and maintenance.

Deliveries of the 3610 disk storage system will begin in the second quarter of 1970.

## Chicago Compso Show Opens This Week

(Continued from Page 1) board, owner, or director; 16.5% were financial officers in their firms; 7.8% were from the ranks of middle management; and 28.2% were from the ranks of data processing management. Less than 10% of the visitors were either programmers or systems analysts.

Most users interviewed by CW at the exhibit found the show useful and were glad they had had the opportunity to talk to

smaller exhibitors which were entering the trade show environment for the first time.

The Compso-Midwest show this week — the second test of the regional computer show idea — promises to be almost as large as the New York show, according to Compso sources. About 90 exhibitors are signed up for the show, which is the approximate number of firms that showed their wares in New York last month.

Pre-registration figures for the Compso-Midwest exhibit are running slightly behind the New York figures, but the show organizers hope to attract as many visitors as were present in New York. They expect the Los Angeles show to top both Chicago and New York in the number of visitors.

The regional nature of the shows is evident. While the organization could not provide a definitive breakdown of the exhibitors for each show, it was estimated that 30% of the exhibitors in New York were regional firms and that regional exhibitors will probably account for the same percentage in Chicago. Regional firms will probably account for 40% of the exhibitors at the Los Angeles show, the firm estimated.

Initial breakdowns now available indicate that the Compso-East show was used by many first-time exhibitors. Around 30% of the exhibitors were new to conventions at the New York Exhibition, and that percentage is expected in Chicago and Los Angeles.

Many of the visitors at the New York show commented favorably on the seminar sessions and speakers there, and Compso indicated that these sessions drew almost 1,800 interested observers.

## Computer Year Hurt

(Continued from Page 1) does plan to send a representative to the coordinating committee meeting this spring in conflict with the national policy of the group, CW learned.

In answer to the charge that it was blocking the project because it could not run the show, an Afips spokesman told CW that "Afips has not taken that position.

"Afips is not against anything that will promote computers or peoples' understanding of them. But any computer year will need more planning and sufficient organization before it can receive Afips support," he said.

While Afips as an association will not participate in the initial planning sessions for the proposed computer year, some of the constituent societies of the association do plan to send re-

presentatives, CW discovered.

Of course, ACM, which is an Afips member, plans to participate in the planning, since the computer year was basically its idea. In addition, the American Institute of Certified Public Accountants and the Society for Information Display, both Afips members, will send representatives to the computer year planning sessions.

In referring to the Afips position, a source at ACM told CW, "If they really believe that this is a good idea that just needs more planning, you would think that they would offer their services and resources to help the initial planning effort."

However, the ACM source added, "I think that Afips will come around and eventually support the project."

## 360s Can Use 35mm Film for I/O

(Continued from Page 1)

IBM says that the film reader recorder does not need to scan an entire transparency. By using computer logic, it can search for information such as a number or letter and trace its shape for the computer.

Images that can be read by the 4481 range from black and white drawings to continuous-tone photographs. Recognition of characters or interpretation of the digitized information depends on the computer program, IBM says.

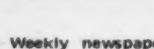
In recording, the exposure is digitally controlled by selecting one of 60 levels. The required exposure range for film and recording increments is obtained by using a neutral density filter at the lens.

IBM illustrated a possible use of the new device by describing how a parts catalog, for which original information is maintained on film, could be revised. First, illustrations would be photographed. Then the photographs would be read by the 4481 into the computer. The text would already have to be on magnetic tape. Finally, the film reader recorder would be used to provide a new film master of the entire catalog, reproducing the photographs and generating the text characters.

The IBM 4481 was designed by IBM's Federal Systems Division, here, and is available from that division on a purchase only basis. Initial deliveries are scheduled for the third quarter of 1970.

# COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY



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## New Small Jury Wheel Holds 3 Million Names, Uses Magnetic Computer Tapes

By Sidney W. Frost

Special to Computerworld

HOUSTON — A totally new and streamlined method of jury selection by computer was unveiled by Harris County, Texas, officials at the University of Houston Computing Center recently.

As an actual demonstration of the time-saving, money-saving efficiencies inherent in the new system, 3,000 jurors were selected by a program written in Fortran on the university's XDS Sigma 7.

Replacing the antiquated and time-consuming method of manual jury selection, the revolutionary new system does in a few minutes what formerly took a battery of clerks, typists, and stenographers several days to accomplish.

Then the names and addresses were typed on cards, the cards cut into strips, each bearing one name and address, and then shuffled, again manually, and ultimately placed in a huge "jury wheel."

Because of the large number of names involved, the entire process was extremely lengthy. In 1969, for example, there were more than 750,000 names in the jury wheel.

Jurors were then selected by drawing the required number of slips from the jury wheel. Even then the process was not complete. Jury lists had to be typed

from the slips drawn, the lists sent to the sheriff's office and jury summonses typed individually.

The new law allowing for the selection of jurors by computer also made it possible for the source of names to be made up from the voter registration list alone. Since the voter registration list is maintained on magnetic tape already, it is only necessary to convert the voter tapes to jury tapes. No typing is required and no checking for duplication is necessary.

The voter tapes are edited by a computer program to remove any unnecessary information and to reformat the required information. The resultant "jury

wheel" tapes are stored in a stainless steel container which, although much smaller, actually resembles the old jury wheel.

In the selection process, the miniature jury wheel is unlocked and the computer is also "unlocked" by the presiding district judge, district clerk and sheriff, who each enter their security codes via the computer's keyboard/printer.

Unless the proper codes are entered, further processing is prohibited by the program.

A random number generator is then used to select the required number of jurors. The numbers generated correspond to record numbers on the "jury wheel" tapes.



Harris County's new jury wheel houses six magnetic computer tapes, each 2,400 feet in length and one-half inch wide. Presently, three of the tapes are used to hold the names and addresses of the nearly 550,000 prospective jurors. The wheel is capable of holding three million names and addresses.

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# Auerbach Foresees Computer Losing Awe in the 70s

PHILADELPHIA — The era of the computer as an awesome and sacrosanct invention will end during the 1970s, according to Isaac L. Auerbach, president of the Auerbach Corp.

"The idolatry enjoyed by the early computers during the 1960s was perpetuated by a generation of users who had, to a great extent, participated in the painstaking creation and refinement of the product. As a result, they tended to ensconce their device in beautifully appointed, glass-walled showcases for all to marvel at. I believe this attitude has been detrimental to the full and proper application of the computer," Auerbach said.

## Breach of Contract Charges by MRC Denied by IBM

By a CW Staff Writer

PHOENIX, Ariz. — IBM has filed a denial to substantially all charges in the breach of contract suit brought by Motor Replacement Company (MRC) last fall [CW, Nov. 12].

Filed here on Feb. 5, the reply seeks dismissal of MRC's \$5 billion class action and also seeks compensation for legal costs already incurred by IBM.

MRC contended that IBM had promised SE services "for the life of the machine" when negotiating the sale of an electronic accounting machine.

IBM replied that requiring such services for "so vague and unlimited" a time would be "offensive to, and violative of, public policy."

IBM also contended that these lifetime "agreements" would have been invalid, since they would have violated New York and Arizona fraud statutes requiring service agreements of more than a year to be specifically outlined in writing.

MRC contended that IBM's "lifetime" promise was part of the sales pitch, and that all "owners of IBM computers and business machines who purchased [them] for their own use... prior to June 23, 1969" should share in any judgment.

The June date refers to IBM's famous "unbundling" announcement, much-publicized and mailed to all IBM customers.

The purchase agreement between IBM and MRC was signed nearly six years prior to the unbundling letter, and states that maintenance service and repair parts will be provided according to "IBM's established prices and terms prevailing" at the time requested.

Although MRC's Model 6400 electronic accounting machine has 40 words of memory and 160 program steps, it is not generally classified as a computer, and "SE services" are not specifically discussed in the agreement.

The inclusion of all owners of "computers and business machines" would make a class numbering thousands, one observer speculated, although MRC lawyers indicated that they had not been besieged by parties interested in joining the suit.

"But soon, we will have a whole new generation of users who have actually grown up with the computer, and to whom it is as commonplace as the telephone and all other mechanical and electrical devices available to serve their needs. This new wave of computer personnel, unhampered by false idolatry, will more readily address themselves to greater, more meaningful applications in this new decade."

Turning to hardware developments in the 1970s, Auerbach said that from a technological point of view, the industry is at a more strategic take-off point than every before.

"Our understanding of basic physics and chemistry and technology is such that we can now accomplish feats that heretofore

were only laboratory phenomena," Auerbach said.

"An example of this progress will be seen during the 1970s in the area of memory techniques for internal operations of the computer. Specifically, we now have a production understanding of thin film technology that will enable us to make major strides in the memory field."

In discussing computer programming, Auerbach stated that computer-aided programming design will be one of the next major developments in the information industry.

"The computer has significantly aided in such things as the design of transformers and motors, as well as in logical design," he said. "However, computer-aided design has not successfully been utilized in the

programming function itself.

"I expect a breakthrough in this area of programming technology to significantly decrease the time required to develop the program and to greatly improve the efficiency of the program.

"Such computer-aided design techniques also will help to overcome the desperate shortage of programmers, a situation which has become a national problem and which has driven the cost of programming sky-high."

In the same vein, Auerbach lamented the information industry's inability to fully specify requirements of a computer program so that it can be independently designed according to specifications.

"During the 25 years since the advent of the computer," he said, "programming has been an

art rather than a science or technology. We have not been able to write a specification for a program to be run on a computer or a class of computers, nor to define the acceptance test with sufficient rigor to enable an independent and distant group to meet the specifications within a dollar and time agreement. In most fields of engineering, this procedure is not only commonplace but is, in fact, the backbone of our industrial society.

"The industry is aware of this problem, and with continued attention to a solution I believe that by 1973 we should be able to produce satisfactory operational programs without requiring very close and frequent physical and mental contact between the user and the programmer."

## Unretouched photo.



Our disk pack.

# 'Counter-Conference' to Protest ACM Chicago Meeting

By Joseph Hanlon

CW Staff Writer

BOULDER, Colo. — Unhappy with the ACM's decision to hold its 1971 conference in Chicago, a group within the ACM will hold a simultaneous "Counter-Conference" here.

The Counter-Conference will be in the standard professional format, according to MIT Prof. Robert R. Fenichel, General Chairman. "We expect our conference to be better than most technical conferences," he declared. "In recent years, the ACM conferences have been crummy. Ours will be really good."

Many professional organizations have relocated conventions planned for Chicago to protest police violence there during the 1968 Democratic National Con-

vention. But ACM (Association for Computing Machinery) members voted not to move their 1971 conference.

## Galler 'Disappointed'

ACM President Dr. Bernard A. Galler said: "I am very disappointed that these people would decide to take things into their own hands after the association has had a referendum at their instigation.

"It was legitimate for them to ask for the referendum, but if the ACM's interest meant anything at all to them, they would have stopped at that point."

The protest "won't be very effective," Galler continued. "They will make people very unhappy. They will be the losers."

He said that the Counter-Con-

ference will hurt the ACM, "but not very much."

He also said that the ACM 1971 meeting will not lose many technical papers or conference attendees to the Counter-Conference.

## Counter-Conference Better?

Fenichel cites two reasons why he expects the Counter-Conference to be better. First, "it will be a superb technical conference because people who don't normally give papers at these meetings are lining up with us on political grounds."

Second, he said, "most technical conferences have a careful system of refereeing for technical papers, but not for panels on social issues. Usually the chairman and his friends just get up and talk."

The Counter-Conference will use the same system of refereeing for all suggestions for panel sessions, whether they have social or technical topics, he said.

## 'We'll Learn a Lot in Bars'

There is no guarantee that the Conference will have panels on social issues at all, Fenichel noted. "But it will be in the air. Even if we have no formal sessions, we'll learn a lot about this [social issues] in the bars of Boulder, which is where you always learn things at this sort of conference."

Chicago is the only specific complaint the group has with the ACM, Fenichel said. But they are also unhappy with the "very conservative" attitude of the ACM.

Holding the meeting in Chicago "is symptomatic of the ACM's response to social concerns," he charged.

## Not Permanent Counter Group

Fenichel stressed that the group setting up the Counter-Conference is not trying to set up an entire counter organization — "That would be a rotten idea."

He also indicated that they were not particularly interested in reforming the ACM, but rather in running a "better" conference.

Organizers of the Counter-Conference include: Professors Jerome Feldman, Edward Feigenbaum, and R.W. Floyd of Stanford; Dr. John C. Reynolds of Argonne National Laboratory; Professor William C. Dorn of the University of Denver; and Professors Fenichel, Robert M. Graham, J.C.R. Licklider, Marvin L. Minsky, and Joseph Weizenbaum of MIT.

The Counter-Conference will be Aug. 3-5, 1971 at the Harvest House Motel. Additional information is available from Daniel D. McCracken, 7 Justamere Drive, Ossining, N.Y.

Nearly all of the organizers of the Counter-Conference are from the academic world rather than from industry, and Fenichel concedes that this may also be true for conference attendees. "Industrial types will be a bit queasy about associating with this."

There will be no industrial exhibits, which will also limit the number of industrial people, he noted.

The Counter-Conference organizers say that nearly all professional organizations that had scheduled meetings in Chicago relocated them in protest to police violence at the Democratic National Convention in 1968.

Only the ACM and the American Physical Society did not relocate, they claim.

Among the organizations to relocate meetings planned for Chicago are the American Mathematical Society, the American Association of University Professors, the American Economic Association, the American Historical Association, and the American Political Science Association.

Also, the American Sociological Association, the American Psychological Association, and the Modern Language Association.

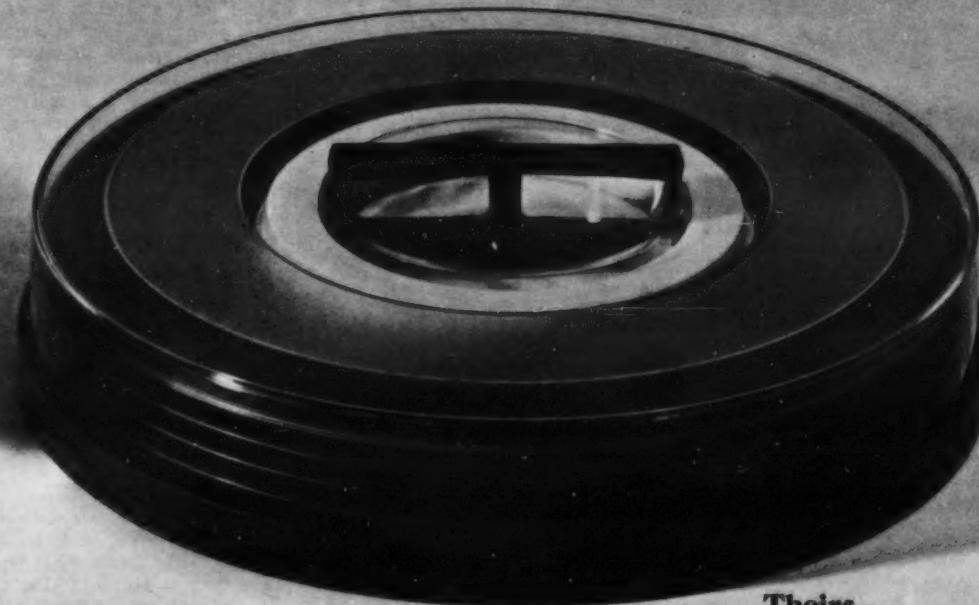
## Bobbies Get Computer Help

LONDON — Police in Britain will get a \$38.4 million computer center that will provide any patrolling policeman with instant facts about known criminals.

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## System/3, Part IV: From 80 to 96

## MiniCard Users Can Expect Conversion Help from IBM

By Frank Piasta  
CW Staff Writer

The 96-column card is creating some of the biggest problems that prospective IBM System/3 users must face. Users expect a great deal of help from the data-processing industry and preliminary indications are that they will be helped.

In addition to IBM, manufacturers of card-handling equipment and even OEM suppliers are planning to lend assistance.

The 80-column card has been around for about 80 years.

Developed by Herman Hollerith, the first large-scale application of the card was tabulating the results of the census of 1890.

It is fitting that the distinction of introducing a new card format should go to IBM, as that company, then known as CTR, consisted in part of Hollerith's firm, the Tabulating Machine Co.

In the intervening years, a huge quantity of equipment has evolved around the old card format. Most of this will have to be discarded or modified for emerging System/3 users.

The manufacturers of card-handling equipment are taking steps to fill the gap. One of the largest companies in this field is on the verge of announcing a new line to its sales force. This line will consist, for the most part, of adaptations to their cur-

rent card-handling and card-filing items.

Virtually all of the familiar devices eventually will be available in the new size.

Prices of the new units have not been established, but the manager of the new products line stated that since the new format enables twice the number of cards to be stored in a given volume, storage cost per card would be significantly reduced.

## Will Accommodate Users

The card-handling equipment maker's segment of the EDP industry is expecting the System/3 to have a large impact and spokesmen say they are prepared to accommodate the needs of

the user.

IBM, as stated in a prior article in this series, is setting up a number of basic systems centers equipped to handle problems arising from the new System/3 installations. These include training, testing, debugging, and file-conversion.

An IBM spokesman said the amount of free time at the basic systems center, available to the user, will depend on the configuration of the System/3 on order. For example, a 12K memory card system would entitle the customer to 23 hours of machine time.

Larger systems will be allocated more time. A 16K memory disk-oriented system, with 7.35

million characters of disk storage, will allow the user 33 free hours, 25 for the CPU and eight for the disk.

Previous articles in the System/3 series appeared in the Dec. 10, 17, and 31 issues of CW.

The user will have an alternative to using the facilities at the IBM basic systems center for converting his files. He can order the 1442 Card Read Punch for delivery with his System/3.

Offered as a Request for Price Quotation (RPQ), the 1442 Model 6 is used in conjunction with the Multi-Function Card Unit (MFCU).

The 80-column cards are read by the 1442 and the data punched into 96-column format by the MFCU.

Speed of the operation will vary with the model MFCU attached to the system. The Model A1 is capable of punching 60 card/min and the Model A2 has a capacity of 120 card/min.

IBM has set the price of the 1442 Model 6 Card Read Punch at \$257 per month. Required also is the special interface equipment that must be installed on the System/3 to allow the 1442 to be connected.

The price of this will range from \$250 to \$300 per month, depending on the model of the System/3 involved, according to IBM.

Whether the user is willing to pay the additional rental charge of \$507 to \$557 per month for the 1442 with the interface will depend entirely on the size of the conversion task involved.

The conversion equipment can be field installed in from 12-14 hours, according to IBM.

One drawback in delaying the decision is the six-month delivery schedule being quoted currently.

Although no official announcements have been made to date, several suppliers of OEM equipment have indicated that they are planning to compete with IBM for the off-line equipment market.

Industry sources have told *Computerworld* that keypunches, verifiers and sorters for use with the 96-column card are in process of development and the next few months should see several of these devices introduced.

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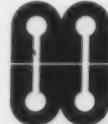


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## Editorials

### Computer Year Deserves Support

The idea of a National or International Computer Year, designed to focus attention on how computers can help solve man's problems and contribute to improving the quality of life for all, deserves the support of all members of the computer community.

The negative reaction of Afips and the IEEE Computer Group to the ACM proposal is unfortunate.

If these two powerful influences in the computer community choose to "drop out" and "not become involved" because they do not think there is enough time to plan for the proposed year, the computer community, the nation, and ultimately the world are the real losers.

Perhaps there is not enough time to plan sufficiently and still begin the computer year in 1970. After all, the planning for the International Geophysical Year went on for more than three years.

But if we are to have rational planning for a computer year, everyone in the computer field should start thinking and planning now. Only by coordinated planning will we ever be able to run and support a project of this importance and magnitude.

We believe that the direction laid down by ACM — to bring in noncomputer societies whose members are affected by computer technology — is the right path to follow on such a project.

It is time, we feel, that the computer community stopped talking to itself.

By asking other societies to participate in a computer year, and by interacting with them and attempting to understand their problems and needs during that year, the computer community can show its maturity, and hopefully its commitment to upgrading the quality of life.

### Guilty Until Proven Innocent

The computer printout sent down from the attorney general's office says that Joe Programmer was once picked up for being at a party where drugs were used, although Joe was never charged with or convicted of any crime. But Joe Programmer's employer says, "I don't want my computer people associating with hippies." The next day, Joe is fired "for doing a bad job."

Impossible? Unfortunately not — it may already have happened on Wall Street.

Last year, Wall Street began fingerprinting brokerage house employees. Based on these fingerprints, New York State's computerized crime data bank has disgorged arrest records on 361 people. Twenty-nine of them have since been fired.

There is no criteria for dismissal; each case is decided individually by the brokerage house. There is no appeal, and there is not even a requirement that fired employees be told why they are being dismissed.

We are sure that in most cases an employer will simply call in the person in question and give him a chance to defend himself. But we are also sure that in some marginal cases, the formality will be dispensed with because "it is too messy."

Yet it is just in such "messy" cases that the individual should have a right to give his side, and have a right to challenge the accuracy or relevance of the information.

As data banks of personal information come into more widespread use, it becomes increasingly clear that laws are required to govern their use. At the very least, a man should get a copy of his dossier every time someone else does. And if a man is fired because of such information, his employer should be required to tell him so.



'Let's Shop Around Some More'

### Letters to the Editor

#### Says Workers in Computer Field Shouldn't Direct Computer Use

With reference to Joan Dublin's letter, appearing in your January 28 issue, regarding Joseph Hanlon's article, I must take exception to nearly every point she made.

It is not for us, the workers in the computer world at all levels, to direct the potential use of computers. As a matter of law, it is the right of the owner or lessee of the computer to direct its use. As a matter of common sense, it is up to all of us as members of society to redirect society's efforts by means of our democratic institutions, including the efforts best implemented by computers.

Miss Dublin's thesis, if carried to other fields, suggests that any employee may direct the tools he uses as he sees fit, surely a route to chaos. If Miss Dublin believes that her occupation of systems analyst endows her, or others of like occupation, with superior insight, then I must again disagree; the ability to code programs and flow charts adds little to one's credentials in determining good social uses of computers.

I do not want atomic scientists determining when to drop a hydrogen bomb, nor factory managers whether to pollute a stream, nor systems analysts how to use a computer.

David W. Chaffin  
President

Computer Databanks, Inc.  
New Haven, Conn.

#### Salary Misquotes Called Cause of Programmer Moves

I was greatly distressed to read the quotation of Robert Half regarding the comparison of starting programmer salaries in Japan versus the U.S.

The June, 1969, nationwide salary survey published by Business Automation Magazine indicated that junior programmers are earning an average of \$8,000 per year. This is not a starting rate but rather an average for persons in that job category with average experience. This would certainly indicate that beginning programmers must start for considerably less than \$8,000 per year throughout the U.S. rather than the \$10,000 as stated by Mr. Half. Misleading statements such as this only increase personnel problems in the data processing industry.

There is need for honesty and accuracy on the part of persons involved in personnel recruiting to help avoid some of the unfortunate movement of data processing personnel from one company to another. Perhaps if managers of personnel agencies

demonstrated more integrity we would find a greater number of employees who would spend their entire career with one company as is traditional in Japan.

Don Voss  
Director of Data Processing  
Jostens, Inc.  
Minneapolis, Minn.

#### Aspects of IAM System Clarified

Thank you for your article in the January 14 issue which describes ADR's new system for interactive algebraic manipulation, IAM. There are, however, two aspects of the description which need clarification.

First, the purpose of the IAM system is to perform algebraic manipulation interactively. IAM resembles Joss, Basic, and Cal; however, the data of IAM are mathematical expressions, while the data of the latter are numbers. IAM can perform arithmetic (as you stated) but it does so as a part of the user-directed process of deriving equations.

Second, IAM is not written in Fortran, but rather in a symbol manipulation language, Ambit/L, which was developed especially for the implementation of IAM.

Carlos Christensen  
Charles Muntz  
Applied Data Research, Inc.  
Wakefield, Mass.

#### Examples of Social Concern Bring Sharp Criticism

God help us all if Joel Bernstein's examples of "where the computer industry has shown social concern" are representative of corporate management's concept of what constitutes social concern. If we in the computer industry (after emerging from a decade which, with a frankness that was often painful, made apparent the critical need for restructuring the country's social, economic and political institutions) cite contributions in the area of "better securities markets" as an example of our social responsibility, there appears to be ample justification for further of Beaver 55's "shock tactics" designed to develop a sense of social awareness in the computer profession. The computer profession has tended to display a reluctance in addressing problems involving "The human equation." Hopefully, this insularity from the most pressing problems of our milieu will not continue.

R. Krikorian  
Air Products and Chemicals Inc.  
Allentown, Pa.

**Student Papers Sought****Can Anyone Help Find Some Non-Resistors?**

The Resistors are one of the most startling parts of the computer scene. A group of teenage, and pre-teenage, youngsters who are headquartered in a barn outside Princeton, N.J., they have successfully survived as a single, growing unit for over three years — an achievement for any unit in the computer field, never mind for a high school club.

Part of the ability to survive is almost certainly their consistent successes in finding something both new, and exciting, to do. First, before they met Claude Kagan and took up residence in his barn, it was the idea of science in general. Then, when they accepted responsibility for the electric bills connected with the junk computers that Claude had around and so obtained the use of them, it was the idea of a computer and the beginnings of how to use them in homework problems and other immediate needs.

**Paying the Bills**

Combined with this was the solid fact of responsibility for that electric bill. To get their enjoyment they had also to take on the cost. This forced a growth of responsibility within the group. It made the positions of president of the group and its other various officers ones which have to produce real results. It forced the buds to grow.

Later, as they went into other ventures, this mixture of excitement and acceptance of unanticipated responsibility continued. When they started running the Rockford Research Institute's proprietary Trac language, they did not realize that

**The Taylor Report**  
by  
**Alan Taylor**



they would have to help defend the purity of the language and the use of its name. When they did find out, however, they took it very seriously.

**Going to Meetings**

As their activities increased over the years, they began to get a name, and began to be invited to various meetings. To start with, they were rather a curiosity piece to be put upstairs on the balcony, patted quietly on the back, and then left to their own devices. But the quality of

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Papers that are not appropriate for the Spring Joint may be accepted for presentation at the  
**IEEE**  
COMPUTER GROUP CONFERENCE  
WASHINGTON D.C. JUNE 16, 17, 18

In their call for papers, the Resistors confused "characters" and "words" and mistakenly called for abstracts of 600 to 900 characters. It's nice to be reassured that the young are not infallible.

their offerings soon put an end to that.

Instead of merely attending meetings, they started being asked to give papers. And they did. At the 1969 Decus meeting they put on a complete exposition of the Trac language. Later that year, they demonstrated a version of APL that was running under the Trac language to Kenneth Iverson, the designer of APL.

**And Now Organizing Them**

Now there is a new case of their taking more responsibility on than previously. This time instead of merely presenting papers themselves at professional meetings they are undertaking the responsibility of organizing and selecting papers from pre-college students for these meetings. This is simply an earned recognition of the quality of their own work. They have been entrusted both by the 1970 Spring Joint Computer Conference and by the IEEE Computer Group Conference with this task.

We should interest ourselves in trying to help the Resistors find these papers. Currently their contacts are almost exclusively with the adult world of computers. There must be other groups of pre-college students who are working together in the computer field, as well as single people that are so qualified. Unfortunately, they are not known to the Resistors.

**Who Do You Know?**

Perhaps they are known to you. Perhaps sitting on your desk is a letter from some youngster asking an intricate

question about a programming code, or a new peripheral. Perhaps when you go down to the "Y" in the evening you have noticed some of the smaller fry walking around with computer manuals. Perhaps even at your own fireside there is a potential author for one of these papers.

The suggested subject matter is all-encompassing. Really anything that can concern computers or related topics is okay.

Alan Taylor, who has been user, writer, consultant, and editor of *Computerworld*, is president of Computer Management Aids Corp.

The Resistors are suggesting new peripherals, gaming algorithms, new interfaces, operating systems, computer art, as well as anything to do with the developments or extensions of computer

languages (which is their own bag).

**Fast Action Needed**

It is again an example of their acceptance of responsibility which is probably the key to their success in surviving. They want to hear from non-Resistors, so that the people outside the group can benefit from the experience and publicity gained by the group. The address is Resistors, RR 1, Box 257, Pennington, N.J. 08534 and the time is short. In fact abstracts should have already been sent in, but I am sure that they will stay open for a day or two yet. I suggest that if you do know of someone, you clip this column and send it or give it to them and urge fast action. I'm sure that it will be worth it for everyone concerned, including yourself.

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# Data Bank Search Leads to Wall Street Dismissals

By Joseph Hanlon

CW Staff Writer

NEW YORK — Twenty-nine Wall Street workers have been fired based on arrest records from New York State's computerized crime data bank.

The dismissals are the first to result from a state law requiring that all Wall Street employees be fingerprinted. The fingerprints are checked through the New York State Identification and Intelligence System (Nysis).

If the employee has a record, the "rap sheet" is sent to N.Y. Attorney General Louis J. Lefkowitz, who passes the information on to the stock exchanges, who in turn pass it on to the appropriate member firm. The firm decides what action, if any, is to be taken. "Rap

sheets" contain information on arrests as well as convictions, and may contain "intelligence" information as well.

No criteria has been set for when an employee should be dismissed, and no special dismissal procedure has been established.

A firm is permitted to fire an employee without telling him that his firing is based on a Nysis report, and the employee has no right to see or contest the Nysis rap sheet. A fired employee has no right of appeal.

## Can Be Fired for Arrests

Conviction is not necessary in order to fire a brokerage house employee; an arrest record is sufficient. Indeed, the stock exchanges and the attorney general's office stressed that it was very important to consider arrests that did not lead to convictions.

Malon Frankhause, a New York Stock Exchange vice-president, said, "Suppose someone was picked up at a party where dope was being used. Even if he was not charged, the firm might decide that an employee of theirs should not associate with this sort of people."

## 14 Principals Have Records

According to Lefkowitz, 20,000 sets of fingerprints have been processed yielding 361 arrest records, including 14 for principals and partners of Wall Street firms. Of the 14, however, only one had been convicted. His case is still being considered.

So far, Lefkowitz said, 29 people have been dismissed or were allowed to resign, 25 quit after fingerprinting but before the record was disclosed, 100 persons have been retained, and 208 cases are still being reviewed.

Spokesmen for the attorney general's office and for the stock exchanges all stress that the decision as to whether to keep a person or dismiss him is totally up to the brokerage house. However, the attorney general and the exchanges exercise an overview of the action.

The spokesmen also emphasized that it is impossible to set up hard and fast rules for when someone should be fired, because each case is different and must be evaluated individually. A representative of the attorney general's Bureau of Security gave a set of examples to show that cases were in fact being evaluated individually: in drug cases, 10 were fired and nine kept; gambling, six fired, three kept; assaults, two fired, eight kept; sex cases, five fired, 12 kept; larceny, 13 fired, 27 kept; and youthful offenders, all 22 kept.

## ACLU Objects

Not everyone is happy with the Wall Street firings, however. The New York Civil Liberties Union feels that the procedure represents an unconstitutional invasion of privacy. It has already lost the first two rounds of its fight — in the Manhattan District Court and the Second Court of Appeals. But it is now preparing an appeal to the U.S. Supreme Court.

In the early stages of the case the Civil Liberties Union represented a computer programmer, John Thom, who objected to being fingerprinted, but he has since dropped out of the case.

The difficulty with the Civil Liberties Union case is that there is no law or precedent in this area. Arthur Miller, University of Michigan law professor and a leading expert on computers and privacy, noted, "We have a legal vacuum, because there was no need to pay attention to this in the past. Nobody thought to look at these records."

"But now that they are centralized and computerized, everyone is running to them and using them without considering the ramifications."

## No Mafia

Originally, the fingerprinting law was billed as a way to eliminate Mafia influences on Wall Street. Apparently, that has not happened. Frankhause told CW that there is no information to indicate that any of the fired employees had any Mafia connections.

## Long Way to Go

The fingerprinting law went into effect last September. Since that time Nysis has processed 20,000 fingerprints. There are about 140,000 Wall Street employees, with a turnover of about 50,000 a year. All employees of stock exchange member firms, from partners to messenger boys, must be fingerprinted.

If an arrest is turned up, the member firm is required to inform both the stock exchange and the attorney general of what action, if any, has been taken. This report is kept on file by the exchange.

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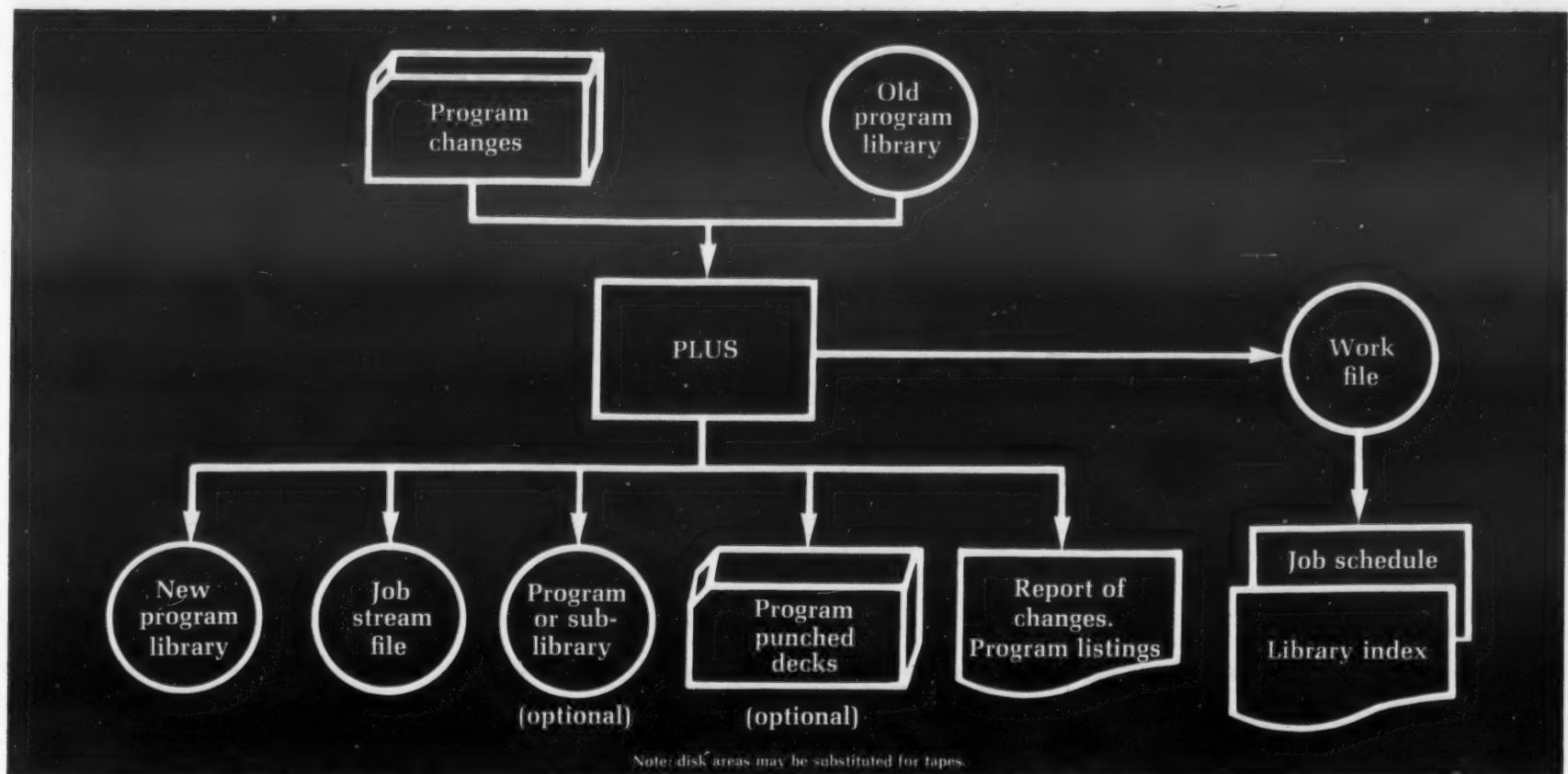


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# U.S. Communications Show Scores a Hit in Britain

By James H. Bonnett

CW European Correspondent

LONDON — Lust, envy, and hunger for the goodies on display at the U.S. Data Communications Exhibition were common expressions on the faces of UK visitors at the exhibition held at the Bloomsbury Centre Hotel late in January.

The expressions were often tinged with regret that the items were not made locally, but among users there was no hesitation to voice their ability to use the peripherals on show, if not now in the very near future.

This attitude was reflected in comments from a number of Americans visiting the UK with their products for the first time.

They were surprised in some cases to find themselves in a sophisticated atmosphere where user ideas, and needs, lagged very little behind that of the U.S.

For peripheral hungry UK computer staffs, the Data Communications Exhibition was a chance to see first-hand many exhibits only shown for the first time at the FJCC in Las Vegas, and all of the products on show had already been seen in the U.S.

Over 4,000 UK users accepted the invitation to visit the exhibition which included displays from 50 companies and 32 products not previously seen here.

The companies exhibiting ranged from the big guns such as roughs and Univac to some of the small and more specialized companies. A notable omission from the show, which was the largest of its type organized by the U.S. Trade Center, was IBM.

Interest in communication oriented systems is currently high in the UK, but with a single authority, the British Post Office, controlling the communications channels, setting the standards for equipment used, and in the majority of cases supplying the equipment, the user has a limited choice in some areas of equipment.

This is particularly true in the case of modems, and, while for example, visitors were keenly interested in the Lenkurt-GT&E 25B modem because of its improved facilities over the standard PO modem for similar multichannel applications, their ability to use it is still subject to limitations.

The general impression gained, from, among others, Bill Hillier, sales manager for Data Tech Industries, GT&E's UK representatives, was that the PO attitude to "foreign" attachments is softening. It is even possible that the PO itself will have to become a customer for foreign built units to meet special needs.

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Not unexpectedly video displays in various styles formed a large sector of the exhibit. Such units are no longer a rarity in the UK, and with experience the user has lost some of his earlier credibility, and is now not so much inclined to be amazed by what they can do as to ask hard questions on price and delivery.

The stand of Sanders Associates, which has established a local base at Hitchin, Hertfordshire, and a high reputation, was one that was always crowded. The visitors here were usually people with experience, and

were discussing detailed points of usage, and deliveries.

The Viatron stand however, with its promises of low prices, but little data on deliveries, seemed to be attracting the casually curious.

Acoustic couplers are still frowned on by the British Post Office in most cases, but they are now being allowed for use in applications where a terminal may be required infrequently at a given location, for example in some laboratories, as well as for demonstration purposes. The only firm really active in the

UK, Vernitron, through its agents Moore Reed & Co., reported an encouraging level of interest.

While the vast majority of exhibitors were pleased with results, this did not apply to them all. Caelus Memories Inc., for example, said they were really in the wrong exhibition but it had still proved good for contacts especially as they are about to start their own company in the UK.

For the user it was a good show, the major dissatisfaction being that "Buy British" policies

can make purchase of the equipment difficult. Differing attitudes to problems, and the "Do It Yourself" attitude of some users were suggesting novel uses of the equipment on show to the benefit sometimes as much of the selling company as the potential buyer.

Most users spoken to were serious in their intent of following up at least one item seen in their efforts to extract the maximum usefulness from their installation. Though just what the conversion rate on inquiries started now will be, only time will tell.

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**SPARE MEMORY BIT CONTROL.** Provides a spare memory bit by expanding the memory byte length and I/O bus to 9 bits.

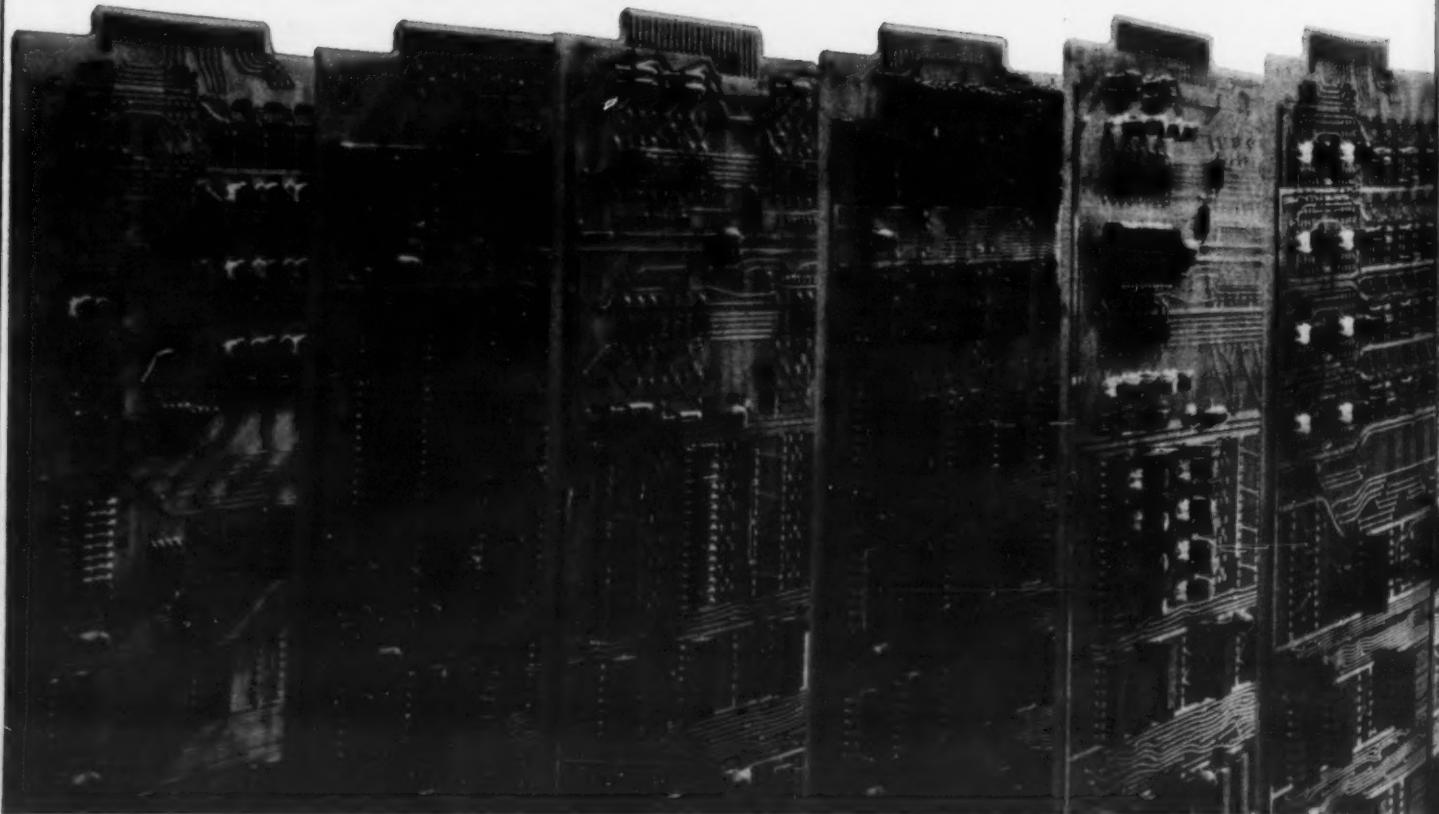
**OPTION BOARD.** Includes all of the above processor option items.

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# We've gone overboard on options



# Communications Society Would Establish Standards

By Ronald A. Frank

CW Communications Editor

PRINCETON, N.J. — A communications organization that would establish professional standards and determine certification criteria for membership is being formed.

To be known as Communications Systems Management Association (CSMA), the organization plans to operate as a non-profit professional society, according to a spokesman.

The idea for CSMA was generated by five communications managers within the computer

data field, according to the group's spokesman, William Rush, communications manager at Applied Logic Corp.

"We conceived the idea to rectify a lack of a cohesive force in the area of communications," Rush said, "Many people need information concerning various aspects of communication and can't find it. The Bell System, which should provide information in this area, unfortunately does not."

In explaining the goals of the CSMA, Rush said that five main points would be stressed:

- Educational development and inquiry in the field of communications and communications management.

- Collection and dissemination through established channels of sound communications practices.

- Promotion of an understanding of the importance of communications.

- A professional voice to promote the development of improvements in communications equipment.

- A generally accepted method for certification of profes-

sionalism within the field of communications.

Adding that the founding group realized the inherent difficulties that would be involved in implementing these goals, Rush told CW, "We feel this is what is required. We hope we can do the organization justice."

In addition to Rush, the original group consists of Donald Sessamen of Princeton Time Sharing Services, Inc., Robert DeLuca and Daniel Nichols of Bell of Pennsylvania, and Donald Conner of Sci-Tek Computer Center Inc.

When asked whether the CSMA would get involved with tariff proposals, Rush said, "We will take positions and very definitely will become involved." He added that the new organization will not duplicate efforts of existing groups such as Adaps, and Afips. "We will work with existing organizations," he added.

Rush added that initial mailings to prospective members would be sent to those now working in the area of communications who had attended a three-month computer communications course given by AT&T.

Asked whether the CSMA could conceivably find itself at odds with the Bell System in tariff hearings, Rush said that this was definitely possible. In response to a related issue, Rush said he did not believe Bell would object to having its employees join a professional organization like CSMA. He noted that two members of the founding group are presently employed by the Bell System.

The CSMA will soon be incorporated in Delaware and will maintain offices in New York City. An initial meeting of the organization will take place in the fall at a site to be determined.

## ITS Increases CP/T/S Service Charge

MINNEAPOLIS, Minn. — International Timesharing Corp., corporate communication dept., has announced increased prices for central processor use, effective March 1, 1970.

John F. Blake, a company vice president, said that the cost of terminal connect time would not change from the present rate of \$10/hr but that charges for use of the central processor would be increased from 8 cent/sec to 12 cent/sec for on-line use and from 6 cent/sec to 9 cent/sec for off-line use.

Prices for on-line disk storage have been adjusted resulting in a slight decrease in charges for smaller storage users and a slight increase for larger users, Blake explained.

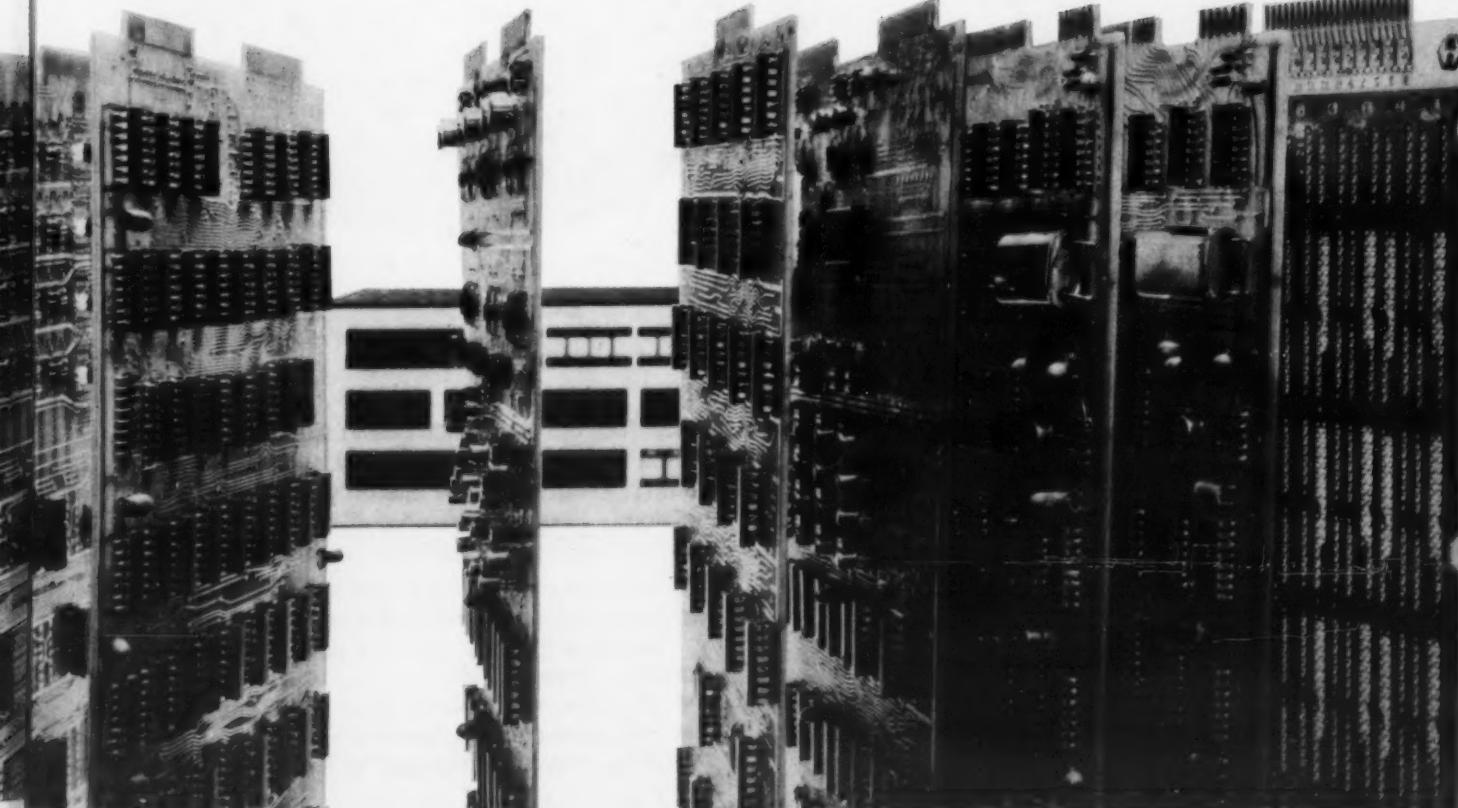
International Timesharing Corp., based at 4620 West 77th St. here, markets time-sharing and programming services from offices in New York, Minnesota, and California.

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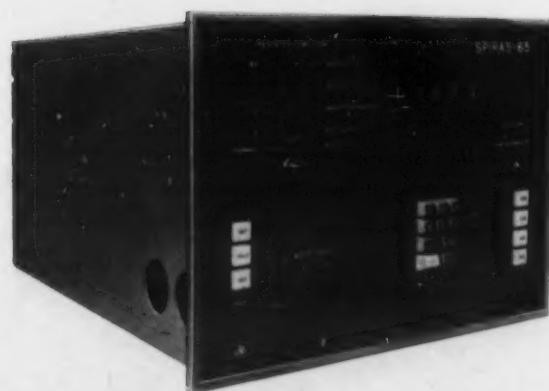
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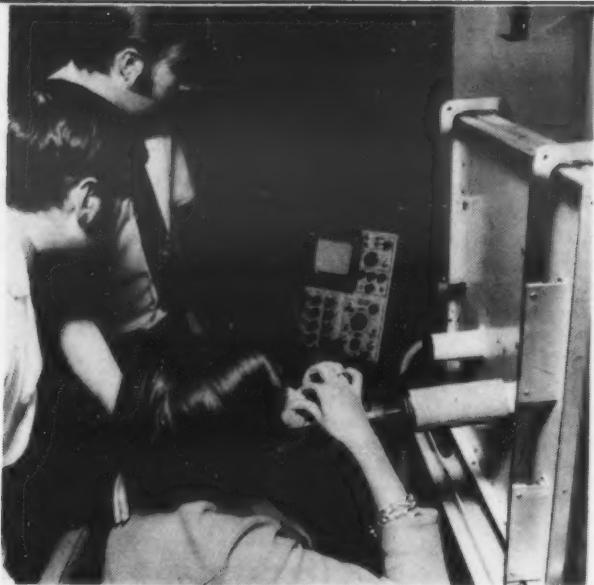
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Researchers at the University of Nebraska Medical Center watch a computerized breathing test. The test will indicate within seconds any sign of lung diseases such as emphysema or bronchitis.

## Computers Help Smokers Detect Early Signs of Lung Diseases

By Peter F. Carr

CW Staff Writer

OMAHA, Neb. — Researchers at the University of Nebraska Medical Center have developed a computer-based breathing test that may help smokers in the early detection and prevention of crippling lung diseases.

Government reports show lung diseases as the fastest rising public health problem, ranking sixth among fatal diseases, and doctors have established a direct relationship between cigarette, pipe, and cigar smoking and lung cancer. Emphysema, an obstructive lung condition, rose 700% between 1950 and 1965. Only heart disease cripples more men

between the ages of 40 and 65.

"One of medicine's major challenges in the coming decade is to control these lung diseases," said Dr. Irving Kass, director of the Pulmonary Disease Section. To meet this challenge we are using our computer and portable test equipment to seek out lung abnormalities by screening large numbers of people quickly and inexpensively."

The computer monitors and analyzes tests performed by a portable spirometer, an instrument for measuring the volume and rate of air leaving the lungs. Researchers produce analytical reports 80% faster and 75% cheaper than with manual

methods.

The breathing test is able to reach large numbers of people, since it can be administered anywhere long distance communications lines exist to link the spirometer with the IBM 1800 data acquisition and control system.

The screening test itself is correlated to a questionnaire that each patient fills out before the test. One of the questions asks whether the patient smokes or not. The computer contains information on people with similar physical characteristics who are not suffering from any lung diseases, but who are also smokers.

A patient is told to exhale as forcefully and as rapidly as possible into a tube attached to the spirometer, which resembles a standing X-ray unit. When the patient empties his lungs of air, the technician or physician signals the computer that the test can be analyzed.

Within seconds the computer compares the flow, volume and duration of the exhalation against standards for persons of the same age, weight, and sex. The computer reports the findings on a printer near the spirometer and is ready for the next patient.

The test however, does not indicate what kind of an obstruction is present, if it is present. It simply indicates that the patient has a pulmonary obstruction of some kind. Further diagnosis is necessary to determine if it is bronchial or emphysemic.

The entire process requires only three minutes. A technician using non-automated spirometer equipment would require 15 minutes or longer to complete the test. The Nebraska system also allows immediate verification of results. With other methods, invalid results often are not known until after the patient leaves.

"Our job is to identify positive or borderline lung abnormalities," said Dr. Kass. "We learn whether breathing is restricted, indicating fibrosis, or obstructed, indicating emphysema or bronchitis. The attending physician is notified and makes the actual diagnosis."

Early detection is important, since at best lung damage can only be arrested, not reversed. For that reason, the test was designed to indicate potential abnormalities.

Leo E. O'Brien, M.D., an associate researcher, recently conducted a field test of the computer-spirometer system with 826 visitors to the State Fair of Nebraska at Lincoln, 50 miles from the medical center. The spirometer was connected with the IBM system via long distance lines.

Reflecting the test's sensitivity to borderline conditions, Dr. O'Brien said some degree of lung abnormality was detected in 30% of those tested.

The research team hopes to test 150,000 persons in this region over the next three years. This would provide experience needed to develop a system which could be used anywhere in the country by regional medical centers.



## Logically speaking... an error-free data input system keeps your computer from going "out to lunch."

A computer should eat up data, not expensive time. If we make it sound overly simple, we're just being *logical*. For we've got an error-free data entry system that keeps computers working without those costly "out-to-lunch" breaks.

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Computer time-shared data from up to 60 key stations... all entering or verifying separate jobs and applications... is one of the big advantages of the LC-720.

It also offers you total security and high speed random access of data. The LC-720 is the only

keydisc system in use that provides a complete IBM/360 compatible disc. Plus a totally compatible 7 or 9 track magnetic tape output.

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## 'PPS IV' Saves 360 Users 20% Over Manual Methods

TULSA, Okla. — PPS IV performs critical path analysis and workload distributions for construction, industrial contracting, computer program development, and other applications where controlling the flow of work among many people with different skills is important.

The package comes from Computing the Information Sciences Corp. (Cisco) and runs on the S/360 under the full Operating System.

According to Cisco, users have reported savings equal to the price of the package on a single application. One refinery using PPS IV experienced average time savings of 25% and manpower savings of 20%, when compared with manual project control techniques, the company says.

Output includes a graphic representation of the manpower workload and the calendar dates attached to the schedule. Other reports display individual categories of worker requirements, amount of time used, percentage of time used, and bar charts to assist users in identifying and verifying the schedule of work.

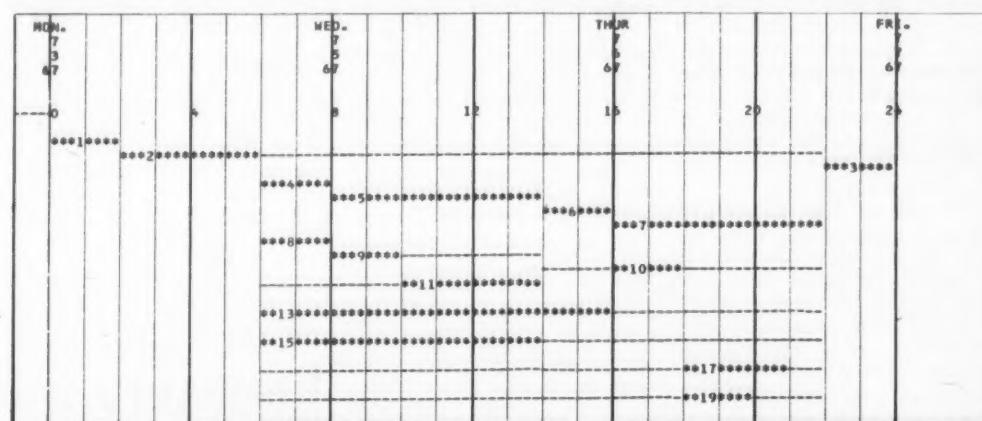
The principle of Critical Path Method (CPM) analysis is the

ability to determine exactly the amount of available resources, the time required to complete each step in a network of jobs, and the order the steps must be completed in a set time.

The basic configuration for PPS IV is a 200K partition. This will support up to 4,000 activities for 600 time units, the company says. Twenty different resources can be considered at once in the 200K version.

PPS IV sells for \$12,000 including installation, training and a year's maintenance. The rental price is \$600/mo and the company offers lease/purchase options.

The company has offices here at Suite 915 in the Thompson Bldg.



A calendar-based schedule and workload distribution for a construction job having many different resources is one of the applications of PPS IV. This is only a fragment of the chart, demonstrating the type of graphical presentations included in the package from Computing and Information Sciences Corp.

## Microwave System Includes Line Sections

NEWTON, Mass. — Dial Data Inc. has developed a general application microwave design and analysis program called Micap.

The program performs steady-state analysis of microwave and low frequency networks of cascaded two-port systems connect-

ed in a tree setup with parallel and series branches.

The capability to incorporate user-defined sections is offered for the first time in a commercial package for microwave circuit analysis, the company stated.

The user may select, for computation, any number out of a total of 29 parameters such as input and output impedances (admittances), reflection coefficients, VSWRs, transmission loss, insertion loss, return loss, phase shift, scattering-, impedance-, admittance-, and ABCD-matrices in either rectangular or polar form over a linearly or logarithmically scaled user-specified frequency range.

The user may also specify a discrete list of frequencies and determine the format of the printout. Commonly used engineering units such as KHz, pF, mH, etc. are acceptable.

Micap enables the user to retain control over the program at

all times, the firm says. This is accomplished by providing a set of 31 commands which can be issued at the user's discretion to specify and modify circuits, analyze them and store them for subsequent recall, correct errors and/or interrupt the analysis at any time without having to restart the program.

Micap is claimed to be the only program of its kind which allows the user to number the cascaded sections arbitrarily. Data entered is selectively accessible for modification. Inconsistent data will be rejected by the program alerting the user by printing a diagnostic message.

The company is located here at 429 Watertown Street.

## Librarian Ensures Data Control

COLLEGE PARK, Md. — A Data Librarian System (DLS) designed to ensure accurate and economical control over the storage and retrieval of data in any form is available from Delta Data Systems Inc.

The package consists of several systems oriented toward efficient operation and management of a data processing facility:

The system also includes several volumes of information on such topics as EDP organizational structures and functions, job descriptions, standards and procedures for the preparation of process sheets, and forms and logs.

DLS produces information necessary to monitor the storage and release of computer related data files, and produces reports which include identification number list, project number list, location number list, and files released list.

This package will be marketed as a part of Delta's proprietary facility management package. The system will be available under a perpetual licensing agreement for \$2,500.

Delta Data Systems Inc. is located at 9903 Rhode Island Ave.

## Users Seek High-Level Inter-Language Translator

By Peter L. Briggs  
CW Software Editor

Although many users are still trying to find ways to convert from second- to third-generation software, those who have accomplished this conversion are

now faced with the problem of compatibility with a high-level language.

Several hundred languages currently are in use in the U.S. and only about five of these are high-level languages: Cobol, PL/I, Basic, APL, and Fortran.

### Freedom Needed

Users have already found the need to control and convert programs freely from one of these languages to another.

This need is caused by the growing mixture of equipment and software being installed, particularly for the S/360.

There are at least five major versions of Cobol, eight or nine major Fortran compilers, three major PL/I compilers, and dozens of Basic and APL compilers, each of which has its individual peculiarities.

A typical DOS/360 user might have two different Cobol and two Fortran versions used with several versions of Basic and/or APL via time-sharing.

The user takes maximum advantage of the equipment and services available by matching the program and programming language to the most readily available and most economical equipment or service.

This matching might require

the ability to run a program in Fortran on a S/360 in batch mode one day, and as a basic application on a time-sharing service the next. An immediate need might exist for a special report that could be produced much faster if it could be run on a remote batch terminal. The additional cost could be outweighed by the time factor only if the program existed in several languages at once — multiplying programming costs beyond reason.

### Basic Language Problems

There has been very little research into the nature of computer languages, nor their suitability for existing jobs in existing major languages. Cobol was conceived 15 years ago for limited computers. It was felt that the need for English far outweighed the problems of applying English to a computer.

With English, there is a problem in making the language compatible with a computer's logic. Natural languages have developed for an entirely different purpose than the expression of a logical process such as a computer program.

The human mind, which deals with natural languages, is far too complex a computing system to

be compared with current or envisioned digital computer systems. The mind has the ability to interpolate data into a complete idea, even when most of the relevant data is not spoken or written.

### Decision Tables Help

Decision table programming offers a possible, although controversial, solution to the problem. If all designs could be expressed in a decision table and a sufficiently flexible processor were available, then it might be possible to convert freely from one language to another.

One basic problem remains. How can capabilities that are directly present in one language be simulated in another language that does not have the required capabilities?

An example might be table look-ups. In some versions of Cobol, this can be done directly and easily, as in PL/I. How would this be achieved in Fortran or Basic? These languages do not possess the 'basic' tools for table searching.

"I foresee a need for general inter-language flexibility within the next two to three years. Certainly before the delivery of IBM's next generation of non-compatible computers," one manager said.



"Hold Just a Minute, I'll Have My Secretary Switch You Over to My Sales Manager."

## Multicomp Tax System Prepares Annual Federal and State Income Tax Returns

NEW YORK — A system for preparing 1969 federal and state income tax returns for use by professional tax accountants in the Boston and New York metropolitan areas is offered by Multicomp Inc.

Tax accountants with a terminal connected to a Multicomp computer can have access to the Multicomp Tax System.

The system does not require specific input forms, according to the company. The person preparing the taxes may enter tax data in a random sequence directly from original source documents on a terminal connected to his telephone. The computer organizes and stores data, computes the tax, and prints the completed tax return on the user's terminal.

The user can enter a client's tax data and obtain completed tax returns in a few minutes for the most simple return.

Complex returns take up to 90

minutes, the company says.

The Multicomp system responds to incorrect data entries with an error message. After all entries are completed, the computer analyzes the data and prints a comprehensive diagnostic report that claims to call the user's attention to apparent violations of statutory requirements, inconsistent data, and overlooked deductions.

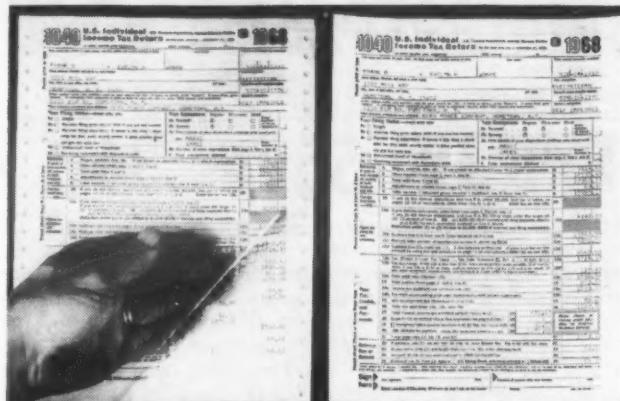
The user corrects any errors and the computer then determines the method of computation that results in the lowest tax, the company said. Corresponding federal and state income tax returns, with necessary supporting schedules, are then printed at the terminal.

The subscriber obtains a computer-determined index showing the relative complexity of the tax return for determining client fees and employee production time.

The company plans to establish Multicomp Tax System offices in most major metropolitan centers in the U.S.

The subscriber pays for the service through the fixed monthly terminal rental, ranging from \$65 to \$125 a month. Multicomp's charge for use of its computer and program may vary from \$1.50 for the simplest federal return to \$25 for a return with numerous schedules.

The Multicomp Tax System is marketed by Multicomp Inc., 36 Washington St., Wellesley, Mass.



Multicomp Tax System produces tax returns on plain, perforated, and continuous form paper. On completion, pages are inserted into pre-printed plastic overlay sheets which correspond to the official tax form (shown on left). The combination of print-out and overlay sheet can be reproduced on office copying machines, as shown to the right.

## Bankserv Adds Time Deposit Accounting

CHERRY HILL, N.J. — An accounting system for single- or multi-bank certificate of deposit operations has been added to the Bankserv package by Arthur S. Kranzley and Co.

Designated the Bankserv time deposit certificate processing system, the system processes regular and automatic renewal time deposit certificates. In addition, reports are provided to fulfill

requirements for certificate account reporting for the investment department, marketing, and internal and government auditors.

With Bankserv the Kranzley Co. claims that the bank can "fine-tune" money requirements based on detailed maturity schedule analysis.

The system requires no manual intervention for renewable cer-

tificates because it recomputes the maturity date automatically. The system also calculates daily interest accrual and prepares renewal notices, according to the company.

The Bankserv system incorporates multi-bank processing capabilities through the use of bank parameters that allow customized rate specifications for each bank, including maximum interest rate and current automatic renewal rates.

Written in Cobol, the Bankserv time deposit certificate processing system operates on a 360/30 tape or disk system with 65K memory.

Headquarters of Arthur S. Kranzley and Co. are located at 383 Kings Highway.

## Cybernet Network Service Expands To Include 10 More U.S. Locations

MINNEAPOLIS, Minn. — Control Data Corp., Data Services Division, has expanded its Cybernet service to include 10 more cities in the United States.

The Cybernet service is a network of large- and super-scale computers, terminal systems, and more than 10,000 miles of communications lines.

The service now is offered in Seattle; San Francisco and Oakland, Calif.; Phoenix; Omaha; Valley Forge; and Hartford.

Additional data centers also have been opened in Long Island; Houston; and Orange County, Calif., CDC stated.

With seven CDC 6600 supercomputer data centers and five CDC 3300 data centers acting as processing sites, the Cybernet

service provides computer power that can be brought directly to a customer through a remote terminal for use at his own facilities.

AMARILLO, Texas — A symbolic Cobol generator, developed especially for IBM 360 DOS/TOS by Management Information Systems Inc., is said to produce programs up to 50% faster than conventional Cobol.

The generator, called Sym/Bol, has operands that relate directly to Cobol and provides capabilities dependent only on Cobol's limitations, according to the company.

Sym/Bol can be used as a source language or as a program generator. The developers of Sym/Bol claim that anything that can be done in Cobol can be done 40% to 50% faster with Sym/Bol.

Sym/Bol is now being licensed to IBM 360 users at \$2,100 for the first installation.

The address of MIS is P.O. Box 9013.

## INTRODUCING



### THE DG-103 DATA COUPLER

The DG-103 data coupler is designed to provide reliable performance at moderate cost.

The DG-103 has connectors for both Teletype Corporation Models 33 and 35, and terminals requiring EIA RS-232-B interface. Full duplex and half duplex operation is provided in the originate mode.

Prices start at under \$400, with substantial quantity discounts available.

For more information, mail the attached coupon, or call:

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P. O. Box 36221 Houston, Texas 77036 (713) 785-5040

I'm interested. Please send me literature for the DG-103.

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# SPS-Type Compiler Cuts Memory Requirements by Three-Fourths

SANDUSKY, Ohio — An IBM 360 compiler called GTS requires 75% less core than a comparable program, according to its developer, George T. Saxon Associates, Inc.

All memory except 636 bytes is said to be available for data and problem programming. The 636 bytes include 80 for card read area, 80 for card punch area, and 132 for a print area. This block also includes core for the hardware-generated status words and the card read, card punch, and print instructions.

Tape, disk and other peripheral instructions are provided as individual card decks and are assembled only in those programs using them.

Disk I/O instructions, when assembled, occupy only 865 bytes and include program overlay instructions and linkage to the disk sort programs. Disk label checking is performed as a part of the program loading routines and requires no additional core, the company said.

## Payroll Service Costs About \$.50 Per Pay Check

NEW YORK — "Packaged data power" for payroll bookkeeping in small- and medium-size companies with up to 500 employees is available from Data Power Inc.

In offering a computerized payroll service, Data Power Inc. assumes the responsibility of a company's payroll, keeps records, and prepares file copies. On preprinted forms supplied by DPI, the employer furnishes employee names, Social Security numbers, payroll deduction data, and wage or salary information. Each pay period the employer supplies only information essential to that period and applicable to its employees, such as days missed and hours overtime.

When the operator at the information processing center receives the data, she phones the computer center, verifies the company's identification code, and enters the payroll information onto magnetic tape which is transmitted to the computer center. Two working days later the employer receives his checks.

If the employer is pressed for time, he can have same-day service.

Data Power can also prepare quarterly and cumulative annual tax records.

Other data, such as an analysis of costs for operating specific departments, can be provided. DPI also supplements the payroll service with hard-copy reports that back up management requirements.

The price is \$10 per payroll period for up to 19 employees.

The company is located here at 711 Third Ave.

Larger programs are written in sections with each section being called from disk as necessary. Programs normally requiring 32K and three disk drives in DOS can be operated in 8K and two disk drives in GTS, the company states.

GTS uses standard S/360 operation codes and instruction formats, similar to 1401 SPS. The company claims that a person who can read a 360 core

dump can program in GTS.

The assembler prints source listings and punches condensed programs at the rate of 400 to 500 instructions per minute.

The system operates on 360 series, Models 25 and 30 and will soon be available on the Model 20, according to the company.

The company is located at 1634 Sycamore Line.

## 'Format 70' Assists DOS/360 Users

BURLINGTON, Mass. — A program to assist DOS/360 users in test data generation and general file processing is now available from Raytheon Service Co.

Known as Format 70, the program requires a 32K S/360, at least one disk drive and a card reader. The program is designed as a load and go utility, requiring no compilation, according to the company.

Format 70 is designed for testing. Because of its ease of set up and use, the program also is suited to certain types of routine production work, such as file-to-file operations, the company stated.

Input is in the form of parameters, said to reduce data generation time significantly.

The company is located here at 12 Second Ave.

**WHO SAID:**  
**"HE WAS A BRAVE MAN**  
**WHO FIRST**  
**ATE AN OYSTER?"**

Jonathan Swift wrote it, simplifying King James I's saying: "He was very valiant that first adventured on eating oysters."

We don't want to blow your mind with trivia. We just want to expand it slightly. With a reminder: Vermont Research is the memory company. We're the company that can expand the capabilities of your computer. We make the best drum and disk memories that are made anywhere. When you want to expand your computer's memory, talk to us. We're simple North Country folk, and we'd love to talk.

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**CORPORATION**  
 Precision Park, North Springfield, Vermont 05103  
 Tel. (802) 656-2555, TWX 710-363-0303  
 DRUM AND DISK MEMORIES - CONTROLLERS

# the Cybercom Mark I shows what's going on

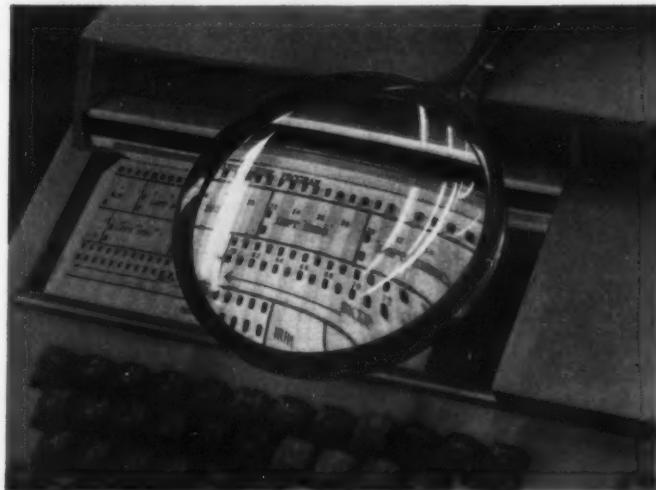
The Mark I graphically displays:  
format  
position control  
error correction procedures

Program card mapping tracks the operator through the record format. The mapping includes an automatic position indicator with the display located near the keyboard.

An error correction system automatically dis-

plays the type of error and the corrective action to be taken. All displays are in English, not codes, and ideally positioned for eye comfort.

The Mark I has been "human engineered," designed with the operator in mind. It has "teaching machine" characteristics. These characteristics combined with program card loading, tape cassette, and off-line pooling, make it the most efficient key to tape system available.



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Sales offices located in New York (212) 972-1932; Los Angeles (213) 776-6761; San Francisco (415) 347-9538; Chicago, Illinois (312) 654-0144

February 18, 1970

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## Large-Scale Storage Units Are Priced Between Large Drums and Extended Core

SUNNYVALE, Calif. — A large-scale memory storage unit, priced approximately between large drums and extended core storage, is being offered by Advanced Memory Systems, Inc.

Said by the manufacturer to be the first application of semiconductor storage to auxiliary memories, the Semiconductor Storage Unit (SSU) is compatible with the IBM 360, requiring little or no software changes.

According to Robert H. F. Lloyd, company president, the SSU will significantly increase CPU utilization and permit higher data transfer rates with more rapid information processing. The unit can satisfy 10 times as many requests as a high-speed drum without overrun and will

allow users to implement multi-programming with efficiencies never before attainable, he noted.

Intended for storage of frequently used programs, such as compilers, the unit is claimed to improve compile times by a factor of 10 and to allow a two-to-five-fold improvement in throughput.

The memory medium of the SSU is integrated circuits and the device has a capacity of two to eight million bytes, depending on the model. Up to 128 million bytes of storage can be attached to a 360 channel. The SSU is byte-addressable and has access characteristics similar to that of a magnetic drum, with access times ranging from one  $\mu$ sec to 525  $\mu$ sec, with an average of 131

$\mu$ sec when random addressing is used. For sequential addresses, the access times vary from one  $\mu$ sec to four  $\mu$ sec, with an average of one  $\mu$ sec.

The manufacturer claims a maximum data transfer rate of 10 million byte/sec, which is said to be fast enough to be used with fourth-generation equipment. This speed would be synchronized by the manufacturer with the channel rate of the computer to which the SSU is attached.

360-compatible models of the SSU will be available in the fourth quarter of 1970. Advanced Memory Systems has said that the product line will be adapted to smaller computers, such as the PDP-8, in the future.

The prices of the memory units range from \$7,835/mo. to \$22,310/mo. Purchase prices of the units are from \$352,440 to \$1,003,920.

Advanced Memory Systems Inc. is located at 1276 Hammerwood Ave.

## Teletype 33-Compatible Coupler Immune to Noise

MOUNTAIN VIEW, Calif. — A family of acoustic couplers and modems, the 240 series, from Anderson Jacobson Inc. is said to be compatible with the Bell 103A Dataphone.

The 240 series couplers offer a flexible rubber cup which allows

The microphone cup contains a switch that shorts out the microphone until the handset is firmly seated. This feature is said to prevent erroneous characters from being generated.

The 240 series employs FM techniques to assure immunity



Acoustic Data Coupler

different types of telephone handsets to be easily inserted while providing a positive mechanical connection and an acoustic shield. The handset floats within the acoustic cups making it resistant to shock and vibration.

to both line and room noise and sidetone effects, according to the company.

These units are available for immediate delivery with a Teletype Model 33 interface at \$375.

Anderson Jacobson Inc. is located at 2235 Mora Drive.

## COMPUTER EQUIPMENT FOR SALE

IPS has the following equipment for sale from its own inventory:

360/20 8K Card System with 2501 Card Reader, 2203 Printer, 2560 MFCM in February, 1970.  
2311 Disc Drives in February, 1970.  
2841 Disc Control Unit in February, 1970.  
2401-3 90KC Tape Unit immediately.  
1401 C-3 System with 1402, 1403 II immediately.  
7330 Tape Units (three available) immediately.  
For prices and specifications, please call or write.



INFORMATION PROCESSING SYSTEMS, INC.

467 SYLVAN AVE., ENGLEWOOD CLIFFS, N.J. 07632 (201-871-4200)

## Cartridge-Loaded Mag Tape System Interfaces With 24 Minicomputers

MOUNTAIN VIEW, Calif. — A cartridge-loaded magnetic tape system for use with minicomputers is available from Tri-Data Corp. The device may also be used with data terminals, test equipment, and process control systems.

Designated the 1024 CartriFile,



Semiconductor Storage Unit

## Card Terminal Represents New Time-Sharing Concept

ARCADIA, Calif. — A card terminal that is said to convert time-sharing terminals into production stations is being offered from Western Telematic Inc.

The CT series terminals are said by the manufacturer to represent a new concept in the time-sharing field. The device allows alternate use of a keyboard with

the reading of standard 80-column cards at a speed equal to that of the transmission rate of the terminal, the firm says.

In operation, a card reader is plugged into the system between the terminal and the data set. Because input is at the full terminal rate, connect time is appreciably reduced compared to keyed entry, according to WTI.

The series features optional internal data sets for direct telephone connection and a field definition code. This code allows more than one program or data statement per card and, in conjunction with a high-speed skip feature, provides efficient card utilization increasing effective reading speed, WTI says.

Such applications as payroll data entry, inventory and order information, and the preparation of financial statements are now practical due to the new feature, according to WTI.

The CT readers are compatible with most time-shared systems using unmodified IBM 2741 terminals, Model 33 Teletypes or their equivalent. Compatibility with the new IBM in-house 360 time-sharing software, ITF and TSO for Basic and PL/I is included, WTI says.

The fixed monthly charge of \$135 includes unlimited card usage and prime time maintenance. The purchase price of the unit is \$4,775. Maintenance charges for purchased units can be negotiated.

Western Telematic Inc. is located at 5507 Peck Road.



1024 CartriFile

the device incorporates a tape transport, read/write electronics, power supply, and tape controller. The product is available with interfaces to more than 24 minicomputers including Digital Equipment Corp. and Honeywell models, according to the company.

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# Time

# yourself.

## Read the results in FORTRAN, BASIC or COBOL.

Because the hardware takes its shape from the software, the IC-7000 offers some distinct advantages to users of time-sharing. You can mix or match sub-routines from different languages within the same program or build your own program language.

The IC-7000 can handle FORTRAN, BASIC, COBOL and assembly language without degradation in any dialect.

It's a powerful, new fourth generation computer with a 256K-36 bit word core. Each user has up to 64K words available in core and can control access to his files at any security levels he programs including "inviolate."

Control and main memories are separate. All overhead tasks are segregated and handled in an economical manner while number-crunching tasks are slammed through tremendously fast, optimized areas. And the IC-7000 can handle

remote batch within the same framework, with no wired-in limitations in any mode.

Our Associative File System lets you call into core with addressing as loose as "Get me all the p's and q's and anything with an r."

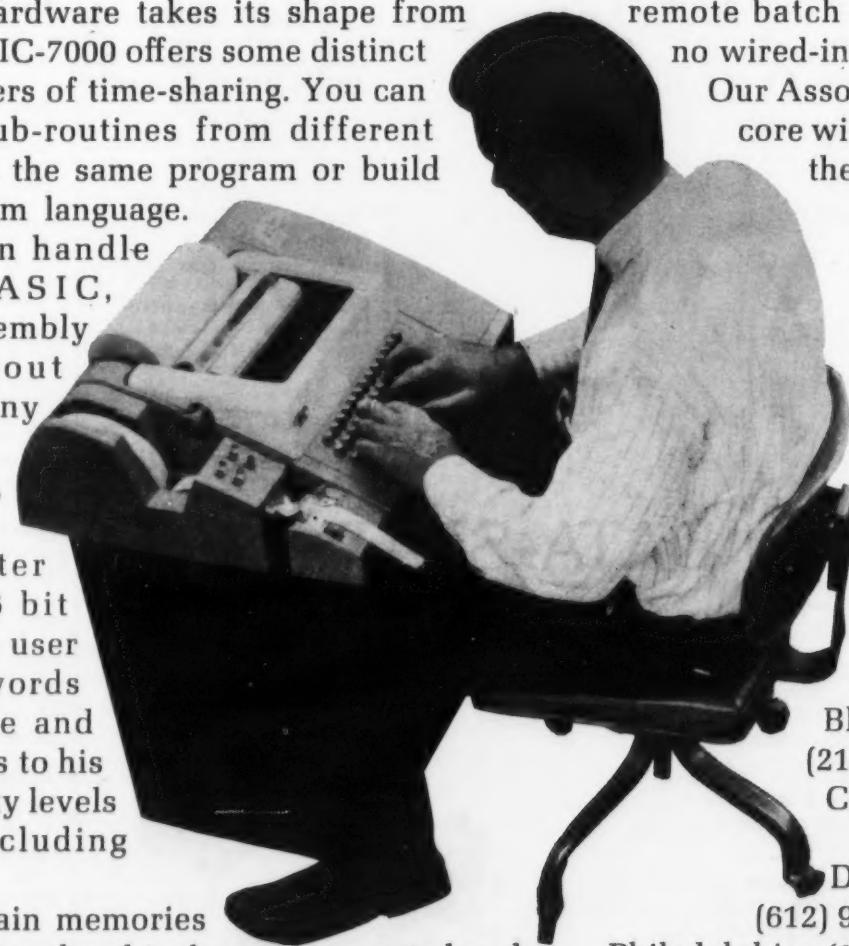
Dynamic time slicing allows programmed self-modulation of queue times to pre-set optimums. And you can tie into TTY, CRT Selectric, Friden, concentrators or even other computers.

There has never been a time like this. For detailed information and full pricing/leasing schedules, contact Bill Otterson, Vice President of Marketing or any of our sales offices.

STANDARD COMPUTER CORPORATION, 1411 West Olympic Blvd., Los Angeles, California 90015 (213) 387-5267.

Chicago: (312) 726-0277; Dallas: (214) 239-9627; Denver: (303) 428-0529; Detroit: (313) 352-1710; Minneapolis: (612) 926-0706; New York: (212) 661-1834; Philadelphia: (215) 563-6350; San Jose: (408) 294-7150; Waltham: (617) 891-5083.

All software for the IC-7000 was developed in conjunction with Call-A-Computer, Inc.



## Standard Computer



A160 Punched Card Verifier

## Series A160 Verifiers Mark Burroughs Entry in Punched Card Verification

DETROIT — Burroughs Corp. has entered the punched card verifier market with its Series A160 units.

The A160 series provides verification of cards punched by the Burroughs A150 card punch as well as verification of cards punched in the standard 80-column format by other keypunch devices.

The A160 series features two separate stacking pockets — a 500-card capacity primary stack-

er for verified cards and a 300-card capacity alternate/reject stacker for incorrect cards.

Other features of the Series A160 verifiers are:

- Three switches which give the operator options to cancel selectively automatic verification when conditional verification is programmed.

- Switch/lights, keyboard lock and audible alarm which alert the operator to an error condition.

- Printing of an "o" mark under row nine when a column is in error and the card is routed to the reject stacker.

- Manual and/or automatic verification at up to 25 card columns/sec, equivalent to verifying one card in approximately 3.2 seconds.

- Automatic verification of all 12 zones of punching, or any combination thereof, in a single card column.

- 64-character movable alphanumeric keyboard.

- Verification of a standard keyboard character set (EBCDIC) which is compatible with

### Systems/ Peripherals

most third-generation computers.

Model A161, which incorporates the basic features, sells for \$4,490 and leases for \$90/month. Model A163, which incorporates the additional feature of Left Zero Fill, sells for \$4,990 and leases for \$104/month. Left Zero Fill permits, through programming, automatic verification of columns containing zeros or blanks to the left of the most significant digit in a given card field.

## Digital Printer Gives Hard Copy At 150 Line/Min

PROVIDENCE, R.I. — The Model 2000 Digital Printer, designed to provide hard copy results of communications system testing, is being offered by International Data Sciences Inc.

Intended for use with the IDS Range Rider Model 1000 Pseudo-Noise Transmission Test Set, the Model 2000 is said to print the fault code, the elapsed time in hours and minutes, and the error count when used with the test device.

The Range Rider is a device used to test communications systems, and is equipped with a transmitter that generates and transmits a pseudo-random bit pattern, and a receiver capable of comparing the pattern received to the generated sequence. The normal output of the Range Rider is a direct decimal display with a 999 limit and an overflow indicator.

The Digital Printer, according to IDS, can record the entire history of an on-line test for extended periods of unattended operation.

Said by IDS to be suitable for use outside the field of communications, the Model 2000 has an input capacity of 12 four-bit numeric BCD char/sec. The device is also equipped with a five character buffer and a timer. Print speed is 150 line/min.

Priced at \$1,950, the printer is available on a 30-day delivery schedule.

International Data Sciences Inc. is located at 100 Nashua Street.

## When is a desk not a desk?



## When it's the new WILSON JONES "DATA-STATION"

"Data-Station" is a combination of a work area "Top" and two Wilson Jones DeLuxe "Data-Racks" locked together.

"Data-Stations" provide a convenient, flat, desk-high surface for accounting, credit, data processing, sales and other departments where constant analysis, reference to, and up-dating of EDP records is made. "Data-Stations" eliminate the clutter and inefficiency of unhouseured printouts.

"Data-Stations" hold up to 12,000 printout sheets in 12 or more nylon post binders, or an equal volume of unbound records in "Data-Slings" or other hanging folders.

This latest Wilson Jones data processing accessory is styled to harmonize with modern office furnishings. Rich teak-grain "Data-Station Top" matches the tops of DeLuxe "Data-Racks." Ball bearing casters provide easy relocation, when required. "Data-Stations" can be locked, keeping contents safe from unauthorized reference or removal.

If you are now using Wilson Jones DeLuxe "Data-Racks," "Data-Station Tops" add a new dimension to your reference and retrieval activities.

### WILSON JONES

Inventor of the Nylon Post Binder • A Division of Swingline Inc.  
6150 Touhy Avenue, Chicago, Illinois 60648



"Data-Station Top" only  
(No. 2-16), \$37.00  
Complete unit ("Top" and 2 DeLuxe  
"Data-Racks,"  
No. 028-16), \$234.90



"Data-Stations" can be  
extended with additional  
"Tops" and "Racks"

For full information, write today.

## 'Gescan' Searches Files at Million Words/Minute

DAYTONA BEACH, Fla. — An information search-and-retrieval system that uses a word-and-phrase-scanning technique to search magnetic tape files at speeds of a million words per minute has been announced by the General Electric Co.

Called Gescan, or Rapid Search Machine (RSM), the system is said to be the first to use everyday language, rather than coded symbols or computer programs, to search and retrieve textual data from magnetic tape files. The system has been in development for five years and is a result of work done by GE in the moon landing program.

Potential users of the system include, according to GE, intelligence centers, law enforcement organizations, legal and patent firms, publishing and broadcasting companies, libraries, and personnel and employment agencies.

Comprising a control console with CRT display, a magnetic tape system with as-

sociated electronic equipment, and an electrostatic printer, Gescan permits the operator to communicate directly with the system in everyday language and to get back an immediate response on the printer.

The system also allows storage and retrieval of total textual files, as compared to key words,

### systems/ peripherals

abstracts, or indexes of abstracts permitted by systems now on the market.

In operation, a search request is typed on the console keyboard. The request may be a word, or word group which is displayed for editing on the display unit. Erroneous and alternate spellings, as well as incomplete words or phrases, are accommodated on Gescan, according to the company.

The magnetic tape files are

formatted into records and sub-records which may be in the form of complete information, abstracts, or both. The records may be in any location on the tape and need not be in any sequence. No physical indexing is necessary and no interrecord gaps are required, GE claims.

Once a request is initiated, it is compared to the entire contents of the tape file, word for word. A 3.5 million-word magnetic tape file can be searched in three minutes, the company says.

The CRT unit displays in real-time the number of times a match occurs during a search. This permits on-line browsing to select effective search terms before printing.

Results of the search are printed out in entire records, selected portions of records, or a selected



Gescan System

number of characters on either side of the matched word or phrase, wherever this occurs in the file.

The system sells for \$189,500, with delivery set at six months.

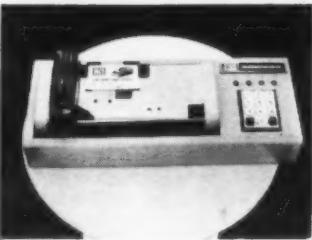
Gescan is a free-standing system with no connection to a computer required. However, GE expects future models to be capable of computer communication.

## Terminal with Imprinter Implements Credit Control

COLMAR, Pa. — A counter-top credit authorization terminal useful for retail stores in converting existing manual credit card imprinters to control credit authorization terminals is available from Credit Systems Inc.

The terminal leases for \$5/month, less the cost of the imprinter.

In such an authorizer/imprinter terminal system, a store's existing manual imprinters, which fit into a well, are coupled to the terminal so as to control their movements. Sales people enter credit card numbers on a standard keyboard, relaying this data to the system's central memory. If credit is approved, the terminal releases the imprinter and the sales slip can be imprinted.



Credit Terminal

The company expects older retail facilities with previous investments in manual imprinters to be the main locations for the terminal. Imprinters typically cost in the range of \$20 to \$30, the company stated.

The address of Credit Systems Inc. is P.O. Box 105.

## A New Proprietary Product For DOS USERS PERFO-ZO

- A fully tested and documented performance tool that provides you with the key to unlock your 360's potential.
- Measures computer performance and utilization.
- No CPU overhead.
- No additional core storage required.
- Easy to implement and use.

Write Mr. F.D. Donant at:

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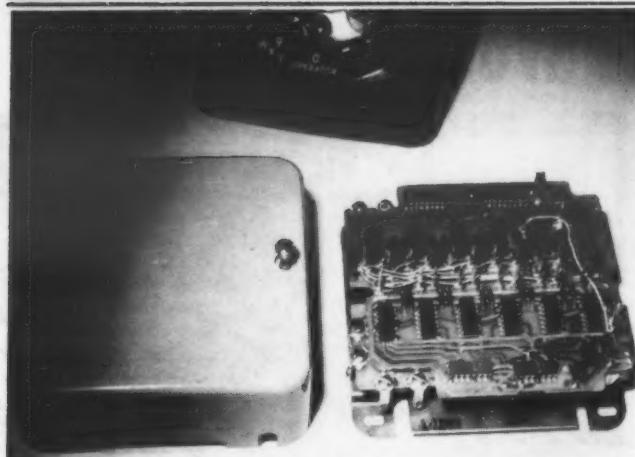


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Single Number Dialer

## Single Number Dialer Gives Telephones Advantages of Leased Lines for \$150

BEVERLY HILLS, Calif. — A device that can give some of the advantages of a leased line to a regular telephone line is being offered by the Idak Corp.

Designated the Single Number Dialer, the device is said to dial any single telephone number up to 14 digits, to sense automatically a calling telephone off-hook condition, and to recognize sequential dial tones for direct outside dialing systems.

Employee time is saved by

eliminating manual dialing, including misdialing or prolonged repeat dialing to break through busy signals, the company claims.

In the automatic mode, the device dials any single number whenever the headset is lifted from its cradle, according to the company. In this mode, the dialer is said to prevent the use of dedicated telephones for unauthorized calls.

In the manual mode, the num-

ber is dialed when a button is pressed. The desired number is selected by pressing the corresponding button.

Multiple telephone numbers

### dp accessories

can be dialed from one telephone by having several units, one for each number, attached to the telephone.

In addition to sensing an open-line dial tone, the Idak unit can sense a second dial tone before placing its call, according to the company. The dialer can also be used to send coded information, such as subscriber identity codes for time-sharing users, over the telephone.

The Single Number Dialer is priced at \$150.

The Idak Corp. is located at 339 No. Maple Drive.

### Control-Racks Transfer, Store Printout Data

HOLYoke, Mass. — A data reference control system for reference and compatible transfer and storage of data processing printouts is available from National Blank Book Co., a subsidiary of Dennison Manufacturing Co.

The system features interchangeability of units, according to the company. The equipment consists of two hanging devices and accessories combined with the Control-Rack 900 series of five storage units.

A connector which is said to be the heart of the system, and which is called the Hang-A-Ref Data Binder, has adjustable slides with hooks. These hook-slides serve as compression devices by holding binder cable-posts in place.

Hang-A-Ref is priced at about \$2.30 per unit. The storage racks are priced from about \$30 to \$150.

National Blank Book Co. is located on Water Street.

### Real-Time Clock for PDP-10 Applications

MAYNARD, Mass. — A real-time clock that provides high-resolution time keeping in real-time applications has been added to the Digital Equipment Corp. range of PDP-10 accessories.

Designated the DK10, the clock device contains a frequency clock with a 10  $\mu$ sec resolution and can operate with a resolution as high as 2.5  $\mu$ sec by adding an external clock, according to the company.

The unit can operate as an interval timer where the interval can be changed under program control. In another mode of operation the clock stops while handling interrupts, and only actual user time spent computing is counted. Under software control, the DK10 can also function as a time-of-day clock.

The unit is available now at \$4,500. Digital Equipment Corp. is located at 146 Main Street.

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# Edutronics Users Examine Psychometrics and Systems

By Kate Rachstein  
CW Education Editor

CHICAGO — The common denominators of user meetings, usually hardware, size, or industry, were largely absent when representatives of more than 70 companies recently met to compare notes on in-house education efforts.

Seeking an individualized environment and refuge from unbundling charges, firms entering the arena of in-house education frequently find their programs menaced by high attrition rates, skyrocketing costs, and a growing collection of confusing, contradictory claims.

To help their users confront these problems, Edutronics Systems International, a producer of educational data processing films and teaching aids, assembled an impressive battery of speakers to share training know-how and help minimize duplicated experimentation.

The participants were primarily those charged with managing a firm's training efforts. Their common discovery was that whether you manufacture outboard motors or breakfast food, with a training budget of a few thousand dollars or several million, there are important problems involved in securing, training, and maintaining an effective EDP staff.

Major attention was given to locating viable sources of programmers and systems analysts; identifying and testing of prospective trainees, isolating the elements of a successful training effort; and measuring the benefits of successful in-house training programs.

## Positive Indicators

In a presentation entitled "Psychometrically Speaking," Dr. Raymond M. Berger, associate professor of psychology at the University of Southern California, emphasized the necessity of determining the "positive indicators" of success in programming.

The industry now needs, he said, a means of integrating the results of aptitude tests with these significant personal characteristics. In this way, Berger feels that training directors could more efficiently choose from among prospective staff members.

Several participants reported varying degrees of success with the commonly used aptitude indicators. Berger admitted to a "general uneasiness" about the widely accepted Programmer Aptitude Test, but said he was unsure of the best alternative.

Also of major interest was the problem of "educating the educators." Addressing himself to

this topic, G. Turner Wilson Jr., manager of Standard Oil of Indiana's education and development division, noted this time allotment for instructors in one successful training program: 20% teaching, 20% preparing to teach; 30% course development; 20% self education; and 10% miscellaneous.

## Education

He cited reductions in training time, outside recruiting efforts, employee turnover, and expense as major advantages to development of an effective in-house training environment.

### Strength in Numbers

Wilson also aroused wide interest in the concept of an education-oriented group, the Chicago Data Processing Education Council.

The council is comprised of firms with active in-house computer education efforts involving 100 or more people. Because of their common hardware, the group finds it profitable to make collective use of facilities and programs that would be impractical on an individual basis.

Describing Xerox's skills analysis training program, David Benanati, manager, systems and

computer education and training, noted, "What we want to do is match the right people to the right jobs with a minimum amount of training, while at the same time providing an avenue for career development which fulfills each and every individual in our company." Applying this approach, he said, the 1969 Xerox training program had yielded "a net savings, after program costs, of \$82,000."

### Sleepers Awake

Problems of formulating a workable systems curriculum for industry were discussed by Edutronics' director of computer science curriculum development, Elizabeth Alexander. "The lack of communication between the user and systems analyst," she said, "is one of the real nightmares of the industry . . . Management has been asleep too long where systems analysis training is concerned."

To alleviate the situation, she espoused a "systems approach" to training and development of systems analysts.

Harold Uhrbach, director of professional services, Auerbach Corp., corroborated her thesis, citing poor work and a continuing search for ever scarcer hu-

man resources as the only alternatives. "Our most sophisticated equipment today is still marching to the tune of second-generation systems design," he commented.

### Cream Rises?

The practice of recruiting systems analysts from among the programming ranks also came under heavy fire. Citing the futility of perpetuating this practice, Dr. Malcolm H. Gotterer, professor of computer science at Pennsylvania State University, quipped that it was tantamount to requiring that "every physician have to go through a period as a registered nurse."

In a concluding presentation, IBM's David B. Mayer proposed a "bill of rights" for the EDP training director. Among the elements essential to the successful training program, he cited a full-time, "up front" position for the training director; an ample training budget; and the managerial latitude necessary to carry out the training assignment.

The atmosphere was relaxed and discussion uninhibited, as one user expressed it, because "Edutronics resisted the temptation to use the meeting as a forum for 'pushing' to its 'users.'"

## Comsonic Offering On-Line Programming Class to Secondary Schools, Colleges

NEW YORK — A course entitled "Introduction Into Programming" for use in secondary schools and colleges has been announced by Comsonic Corp., a firm specializing in on-line systems and services.

The course utilizes remote terminals at the school connected to Comsonic's Comdac-8 time-sharing system, based on DEC's PDP-8/I. Classes may be taught by either the school's faculty or by a member of the firm's educational staff.

Developed by Comsonic's manager of educational services, Dr. Frederick Schiro, the one-semester, 15-week course will meet

once a week for three hours. One hour will be devoted to laboratory practice; two hours to classroom instruction.

Comsonic Senior Vice-President Clement DeSimone stated that charges would usually amount to between \$5 and \$10 per hour of connect time, depending on the number of students enrolled. There is an additional charge if Comsonic person-

nel conduct the course.

Students will learn mostly Basic and Fortran programming, he said, but added that instruction in other languages would be available.

Recommended class size for Introduction Into Programming is 20-25 students, according to DeSimone. The course is now being marketed for use in September.

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## X3 Acts at First 1970 Meeting

NEW YORK — The Computers and Information Processing Committee (X3) of the American National Standards Institute (Ansi) recently held its 37th meeting in Scottsdale, Ariz.

Among about 35 attendees were two potential new member associations, representing independent software companies and state governments.

Actions of note taken by the committee during the two-day meeting included:

- Authorization of a letter ballot to approve two Electronics Industries Association standards as American Standards. They deal with the interface between data terminal equipment and data communications equipment, and the interface between data terminal equipment and automatic calling equipment for data communications.
- Approval of a report agreeing on revisions of the proposed American Standard on bibliographic information interchange on magnetic tape (Z39.2-1969).

• Authorization of the publication and a letter ballot on a draft American National Standard Identification of States of the United States for Information Interchange.

• Acceptance of a subcommittee report scheduling development of functional electrical and physical channel I/O interface standards. The subcommittee, X3.9 on interface standards, was directed to submit to the Standards Planning & Requirements Committee (Spac) a schedule for the development of device interface standards. Spac will review the schedule and transmit it to X3 for the upcoming April meeting.

• Spac was requested to review and submit recommendations to X3 on the proposed scope and program work of the composite language development group. This group is currently considering the feasibility of standardizing PL/I in collaboration with the European Computer Manufacturers Association

(ECMA) and the International Federation of Information Processing's technical committee on programming languages.

• Approval of a revised statement of the scope, program, and operating procedures for the subcommittee on terminology and glossary (X3.5). It was noted that the last obstacles to the revision of the USA Standard Vocabulary for Information Processing have been removed, and that Ansi's publication of the revision could be expected shortly.

• The recommendations of the *ad hoc* group on data descriptive language were deferred, and Spac was directed to consider the formation of a "data descriptive language group."

• Support of a recommendation by the international counterpart of X3, ISO/TC97, to investigate the desirability of an international standardization program for magnetic tape cassettes for digital information interchange.



COMPUTERWORLD

## societies

## FJCC Names Best Speaker

MONTVALE, N.J. — IBM's James P. Considine has been named winner of the Best Presentation Award by Eugene M. Grabbe, chairman, 1969 FJCC Technical Program Committee.

Considine's paper, "Establishment and Maintenance of a Storage Hierarchy for an On-Line

Data Base Under TSS/360," was presented in a software session chaired by Dr. Robert R. Brown.

All speakers were offered pre-conference assistance. According to Grabbe, the '69 FJCC is thought to have been the first major conference to video tape all presentations for judging.

## Sigspac's Bimonthly Bulletin Now Available on Subscription Basis

NEW YORK — The Bulletin of the Special Interest Group for Urban Systems, Planning, Architecture, and Civil Engineering (Sigspac) of the Association for Computing Machinery (ACM) is now available to institutional

subscribers on a yearly basis.

Single copies will be distributed for \$3.00 each. The yearly subscription rate for six issues is \$18.00. The ACM is located at 1133 Avenue of the Americas, New York 10036.

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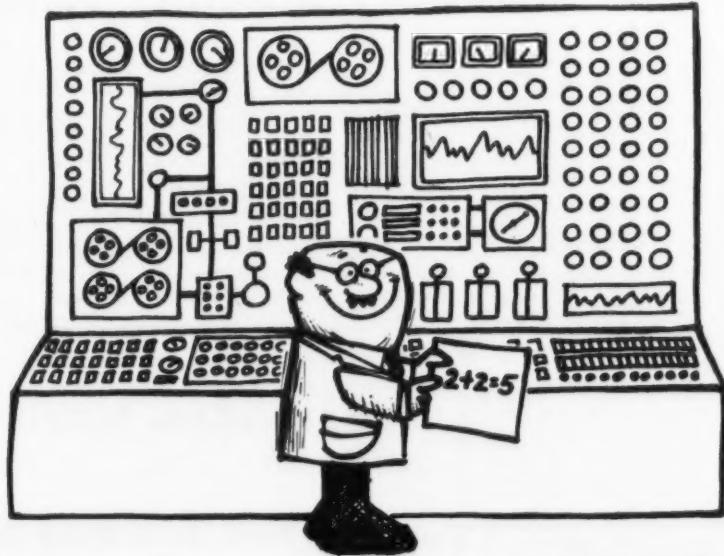
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February 18, 1970

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## 10-Year-Old Air Traffic Control System Still Stalled

By Drake Lundell  
CW New York Bureau

WASHINGTON, D.C. — While the nation's airports and airways become evermore crowded and dangerous, an almost 10 year old system for automating the national air traffic control network remains stalled on the ground with no takeoff in immediate sight, congressional hearings revealed last week.

The project under scrutiny by the congress is the proposed National Airspace System, which is part of the automation program for the en route air traffic control system. This system controls aircraft in-flight, but does not aid air traffic controllers in helping planes land and take-off, which is the function of another Federal Aviation Administration program, the terminal automation program.

At the hearings before the House Subcommittee on Government Activities chaired by Rep. Jack Brooks (D-Tex.), IBM came under heavy fire for its role in developing software for the system, but congressional sources indicate that the industry leader is not the only cause for delay of the system.

As one congressional source put it, "Sure IBM has to share some of the blame for delays in the system, but they're not the only ones that screwed-up. They had plenty of help from the Federal Aviation Administration (FAA) and Raytheon."

The huge project is designed to automate many of the functions handled by air traffic controllers in guiding domestic aircraft, especially near the most congested airports of the nation.

The project, sponsored by the FAA, has been in the works for almost 10 years, and contracts for the first equipment to be used as a part of the system were awarded in 1963. IBM became involved in 1965 when it won the major computer portion of the contract, and Raytheon was signed to develop the displays in 1967.

To date there has yet to be a workable prototype of the system placed in operation, or even delivered for testing.

### Programmers Inexperienced?

At the initial hearings recently, the staff of the Brooks committee presented a report claiming that some of the programmers assigned to the project did not meet contract specifications, although committee sources told CW that it was "exaggerated" to claim that the programmers were "inexperienced."

The committee reported that the contract for the programming of the system called for 200 "well qualified personnel trained specifically" for the program at the time of assignment to the project.

However, the committee claimed that of the 153 programmer resumes on file with the FAA, 36% were recently hired and only nine of this group had more than two years experience. An additional 27% of the programmers received only an eight-week

training course before assignment to the project, the committee stated.

One source in the FAA, however, indicated that IBM had not violated the rules of the contract by assigning so many newly hired programmers to the project. "A percentage of between 15% and 30% of junior programmers on a project this size is not considered unreasonable," he said, "and I think that IBM will have been within those limits when all the facts are in."

"After all," The FAA spokesman said, "you can't have all senior programmers on a project like this or you would never get any of the routine work done."

### Programmer Story Clouds Issue

Even subcommittee sources feel that the "inexperienced programmer" story only serves to cloud the real issue, which they see as bad management on the part of the FAA in handling the development of such a complex system.

The subcommittee noted that the administration had not appointed a prime contractor for the project and had taken all responsibility for system integration of the three major elements of the program.

The first contract in the project went to Burroughs Corp. in 1963 for four prototype models of a Common Digitizer, which serves to convert radar data to digital form. The initial units, which are basically upgraded military systems, were delivered on schedule, FAA says.

However, national priorities being what they are, the Air Force immediately "requisitioned" two of the four prototypes for use in Vietnam.

Raytheon will not admit, as some congressional sources have indicated, that they "grossly underestimated the size and complexity of the project" but does say that someone "grossly underestimated" the data load to be handled by the system.

The firm was to have delivered a prototype display in March of 1968 but has not developed a display yet that meets contract specifications. Raytheon spokesmen blame the delays on changes requested by the FAA and indicated that the administration has changed the display specs in more than 300 instances, with the last major changes coming last July.

The FAA hotly contests this, however. One source in the agency told CW that "specification changes and improvements are not the cause of the delay. Raytheon has not even produced a prototype display that can meet our original specifications."

"The major requirement that the display be able to write a character anywhere on the screen in less than two microseconds has not yet been met," he added.

At present, Raytheon officials say they will have a prototype in operation this June, but indicate that it will be a crude version of the eventual display and that it might not meet all the contract

requirements even then.

Raytheon stands to be the biggest loser in the project, because it signed a fixed-price contract for development of the display. This means that any overruns in development time will have to be absorbed in-house.

As one Raytheon official put it: "On this project our profits will be minimal at best."

Raytheon officials also indicated that they felt they were being forced to build a highly advanced display just to fit the IBM software, instead of the software being developed to support the display. Since it has a fixed price contract, a Raytheon official said the FAA was asking it to alter the displays in order to keep down the cost of the software development project, which is on a cost-plus-fixed-fee basis.

IBM entered the picture in 1965 when it received the contract for the computers used in the system. The machines, designated the 9020s, are reworked and reconfigured 360/50s and as such have presented few problems in development.

At the same time, however, IBM was given responsibility for the operational programs for the project and for the test and evaluation programming. "Now, after a five year development time, we still don't have any

programs that will run," congressional sources said.

While IBM refuses to comment on the project, IBM apologists in the FAA said that IBM could not be held fully responsible for

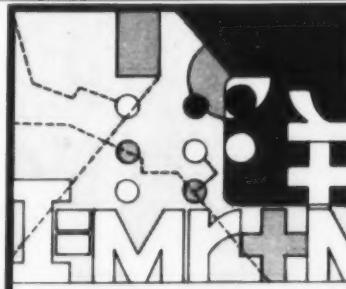
its failure to deliver the programs. They said that IBM has been hindered because it had no clear specifications on the interface between the computer systems and the displays.

## GRI Ships First Unit



T1

GRI Computer Corp., Newton, Mass., has shipped its first machine to Integrated Systems, Inc. of Norcross, Ga. Here Irvin M. Stone, vice-president of marketing, and Samuel Ochlis, president, look over the GRI-909 direct functional processor that will be used by Integrated Systems as a software common master supervisory control system for electrical utilities. Ochlis said the company has firm orders for 80 more units.



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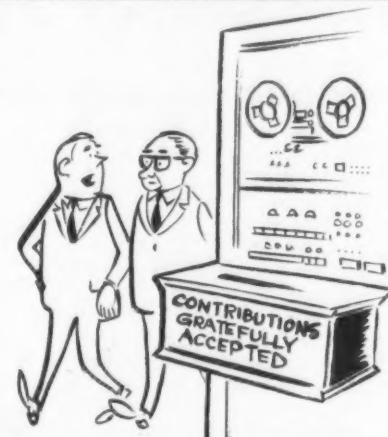


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## Orders and Installations

In the four days that followed its introduction, more than 150 orders were received in Maynard, Mass., for Digital Equipment Corp.'s PDP-11. The PDP-11 is a 16-bit, byte-oriented machine that features a bi-directional bus or data path called Unibus. Uses planned for the first PDP-11s include data communications, industrial data acquisition and control, laboratory data reduction, numerical control, character editing, and display control.

Central Beheer in Amsterdam has purchased a large-scale OCR system from Recognition Equipment Nederland N.V., the Dutch subsidiary of Recognition Equipment Inc., Dallas. The purchase of the electronic retina computing reader is the society's first step in optical character recognition processing. The system will read information supplied by the society, translate it into computer language, and record it on magnetic tape for further computer processing.

London Life will install two Key-Edit systems at its London, Ontario, headquarters. Key-Edit, an electronic data preparation system designed and produced by Consolidated Computer Services Ltd., Toronto, Ontario, will replace 48 key punch hand verifier units with 32 Key-Edit input stations feeding two tape drives.

A new \$1 million Univac real-

time system ordered by the Totalisator Agency Board, Canberra, Australia, of the Australian Capital Territory will provide bettors on horse and dog racing events with better service. The system, two Univac 9400 computers and peripheral equipment, will enable bettors to place their wagers up to the starting time of the event and receive any winnings almost immediately after the end of the race.

Computer Co. Inc., Birmingham, Ala., has installed a \$1 million Univac 1106 system to be used by Birmingham area hospitals, clinics, and physicians groups. The primary applications will consist of processing laboratory reports, implementing the improved patient care system, and patient accounting.

The global operations of Fluor Corp., Los Angeles, will be monitored and reported by its newly installed Control Data 6400. The system will give Fluor timely information on the progress, needs, and incurring costs at each of its construction sites throughout the world. A Control Data 3200 has been purchased by Norwegian Water Resources & Electricity Board, Oslo, Norway. This system will handle statistical, technical, and administrative data processing.

To establish a total information file system as it relates to

savings and loan applications, Oklahoma City Federal Savings and Loan Assoc. ordered a Burroughs B2500 system and TC700 terminal units valued at more than \$750,000. Spartan Mills, of Spartanburg, S.C., has also installed a Burroughs B2500. Other Burroughs installations include a B3500 and 50 TC500s at Data Associates of Washington, D.C.; a B3500 at Aries Corp., Fairfield, N.J.; a B350 at Financial Computer Services Inc., of Commerce, Ga.; and a B500 system at Nassau Trust Co., in Glen Cove, N.Y.

Systems Engineering Lab., Inc., Fort Lauderdale, Fla., received an order for 40 System 810A computers from Fairchild Graphic Equipment, a division of Fairchild Camera and Instrument Corp. Fairchild will use the real-time computers as the heart of its Comp/Set 330-1 automatic typesetting system. Comp/Set 330-1 includes computer pro-

grams for both hot metal and phototypesetting and a broad range of peripheral equipment including CRT editing terminals.

Maynard Data Processing has installed an IBM 1287, Model IV optical scanner. The scanner can be used in accounting firms, retail stores, businesses with large fleet delivery operations, and any business where raw data is originated.

In Fort Wayne, Ind., Transport Motor Express has decided to expand its data processing operation with an NCR Century 200. Four other carriers in the Minneapolis area are designing a cooperative data center around a Century 100 system.

The First National State Bank of New Jersey has added its third GE system, a GE-405, to handle an expanding information processing load. Standard banking applications performed by the system include demand deposit accounting, account rec-

onciliation, and installment loans.

Computer Machinery Corp., Los Angeles, has announced that Data Tech, a Los Angeles service bureau, has placed an order for the CMC keyprocessing system. The system is a computer-controlled keyboard input system designed to replace keypunches and key-to-tape units.

An IBM 360/65, valued in excess of \$3 million is being installed at the Princeton, N.J., facilities of Princeton Time Sharing Services, Inc. to serve its time-sharing and remote-computing clients.

Financial Data Systems, Inc. of St. Louis, Mo., has received orders for its on-line financial software system from Nebraska Savings and Loan Assoc. of Omaha, The Greenwich Savings Bank of New York City, and the First Jersey National Bank of Jersey City, N.J.

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Irvine, California 92664, 714-549-3329



## APT Relocates in New Quarters

HUDSON, Mass. — Applied Programming Technology Corp. has moved into a larger, modern facility at 275-D Cox Street here.

APT, a subsidiary of The Gerber Scientific Instrument Co., S. Windsor, Conn., specializes in the areas of digital computer programming, analysis, design, and documentation, as well as offering consultation services to manufacturers and other users of digital equipment.

APT, formerly located in Sudbury, Mass., now occupies 3,500 sq ft in the new quarters.

The company is currently active in developing programs for graphic systems, hybrid computer systems, proprietary packages, and software for the areas of real-time and scientific applications.

It also provides programming software support for Gerber Scientific and its subsidiaries. It recently developed for Gerber the 3G program, a graphics language compiler for use in photographically generating printed circuit and integrated circuit masks.

### Image Systems Establishes European Office in London

CULVER CITY, Calif. — Image Systems, Inc. has established a European office in London.

The office will be the base of operations for Image Systems' marketing and customer services activities throughout Europe.

The company designs and manufactures rapid-access microfilm equipment and systems for information storage, retrieval, and display.

The British telephone system will begin using Image Systems' card micrographic storage and retrieval system in two southern England cities this year to provide speedy directory assistance to British telephone subscribers.

The company has also announced an exclusive sales agreement with Takachiho Koheki Co., Ltd., of Tokyo for the distribution of the card in the Far East.

### Other Expansions

Analytical Systems Corp. has moved to new larger quarters at 11 Ray Ave., Burlington, Mass. The company is engaged in systems engineering, planning, and development in the fields of communications, education, environmental control, transportation, and urban development.

Applied Data Research, Inc. of Princeton, N.J., will move into new executive headquarters and computer research center in February. The 31,000-sq-ft, two-story building is situated in the same industrial center where the company previously occupied a smaller building. It will house the executive offices, research center, programming staff, and two computers.

Computer Data Enterprises, Inc., Jenkintown, Pa., has signed a two-year lease for additional office space in the Beaver Hills Building which occupies a site adjacent to CDE's headquarters. The corporate address remains unchanged.

Princeton Time Sharing Services, Inc. has opened new offices at Two Pennsylvania Plaza, New York. The new location is immediately adjacent to Madison Square Garden and the Penn Central Railroad station.

Computer Communications, Inc., Inglewood, Calif., has opened an office in New York. The company's product line includes communications terminals, multiplexers, computer interfaces, and related equipment.

U.S. Magnetic Tape Co., Huntley, Ill., a subsidiary of Wabash Magnetics, Inc., has made plans for a 7,200-sq-ft addition to its digital and video tape production facilities.

URS Data Sciences Co., San Mateo, Calif., has opened a branch office in San Juan, Puerto Rico. The new office is at G-511, 145 Hostos Ave., Hato Rey, Puerto Rico. URS Data Sciences is a nationwide EDP products and service firm with offices in 13 U.S. cities.

Advanced Computer Systems, Inc., a computer consulting and programming firm, has leased 3,000-sq-ft of office space in the new Cox Plaza Office Park on S. Dixie Drive, Dayton, Ohio.

Westinghouse Electric Corp. has opened an information systems laboratory in Tampa, Fla. The office, at 5440 Mariner Blvd., will serve customers in Florida, Georgia, and other southeastern states.

Macro Services Corp., a subsidiary of Chubb Corp., a New York insurance holding company, has moved to 131 Tremont St. in Boston. The company is engaged in systems consulting, software development, and computer services.

## Advance Data Opens Two Centers

PHILADELPHIA, Pa. — Advance Data Corp., a newly formed computerized personnel information firm, has made plans for the opening of its first two centers in the Delaware Valley.

The newest center, "Center City West," is located at 1700 Market Street and will officially open in March.

Another center, "Center City East," has been operating on a limited basis at 6th and Chestnut Streets, and also will begin full scale operation in March.

Advance Data consists of a nation-wide on-line data bank information service

available to both individuals and companies. Direct service will be offered through local offices, each of which has direct communication to the central data base.

Individuals register their experience and career objectives into the data bank at the local office. A comparison report analyzes the applicant's background and income request compared to all others with similar experience and education.

Advance Data plans to have a national network of centers by 1971, with some being company-owned and the majority operated on a franchise basis.

## expansions



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to feed a computer...**

## Acquisitions

**Intech, Inc.** of Minneapolis, a computer software development and facilities management company, has agreed to purchase about 60% of the outstanding common stock of **Data Methods Corp.** of Denver, Colo., a company that markets administrative data processing services to business and educational customers.

**Computer Dynamics, Inc.**, Berkeley, Calif., has terminated merger talks with **Jin-A-Graphics Printing Co., Inc.**

Plans have been announced for a merger of Air Force Logistics Command's (AFLC) Advanced Logistics System Center (ALSC) with the AFLC Comptroller. The interrelationship of the two organizations extends to the use of computer equipment throughout the AFLC. The comptroller is responsible for management of EDP equipment command wide. The ALSC develops and designs programs

used on AFLC's computers to perform the world-wide logistic support mission of the command.

**Automation Technology, Inc.**, Santa Barbara, Calif., and its subsidiary, **Tax Corp. of America**, Washington, D.C., have approved an agreement to consolidate the two companies. Under the proposed terms of the agreement, TCA will issue two shares of its common stock for each one share of Autotech common stock currently outstanding. According to a company spokesman, the proposed consolidation will result in a company with a solid and established base of operations in the computerized consumer services field.

**Houston Fearless Corp.**, Los Angeles, is considering a merger with its 80% owned subsidiary, **Image Systems, Inc.**, Culver City, Calif. Terms of the proposed merger call for conversion of each Houston Fear-

less share into 1/10 of one share of Image Systems series B common, and approximately .0078 of a share of Image Systems common. Image Systems, a successor by merger of HF Image Systems, Inc., as the surviving company would continue to concentrate its activities in the field of micrographic systems.

**URS Systems Corp.** of San Mateo, Calif., plans to acquire **Remote Computing Corp.**, a Los Angeles-based computer network information service. Terms of the proposed acquisition, which will not become effective until 1971, call for two annual payments each of URS common stock. The total number of shares to be issued will depend upon Remote Computing's earnings.

**International Telecomputer Network Corp.**, Bethesda, Md., a time-sharing and data processing service company, has

reached an agreement in principle to acquire substantially all of the assets of **The Matrix Corp.**, with principle offices in Los Angeles and Boston. The two companies have tentatively agreed upon an exchange of 400,000 shares of ITN stock for Matrix assets. The number of shares to be exchanged may be increased by 100,000 under certain conditions.

**Diversified Computer Services, Inc.** of New York, a computer software company, has concluded negotiations to acquire two companies. They are **Data Process Services, Inc.**, New York, a computer software company, and **Wingate Personnel, Inc.**, New York, an employment agency specializing in the placement of data processing personnel. Both companies were acquired on a pooling-of-interest basis.

## Contracts

An 18-month contract was signed by **SMC Computer Services, Inc.**, Dallas, and **Success Motivation Institute, Inc.**, of Waco, Texas, whereby SMC Computer will provide a software package especially designed for a "captive" finance company.

**Ampex Corp.** has begun delivery of simplified core memory stacks under a \$500,000 contract from **Digital Equipment Corp.**, Maynard, Mass. The Ampex planar pluggable stacks will be incorporated in the core memories of various DEC computer product lines. Ampex stacks use a design that eliminates all cabling, connectors, stack hardware, and hundreds of operations previously necessary in producing and using core stacks.

Under a \$121,012 contract with the **Federal Aviation Administration**, IBM will furnish 43 printer-keyboards and ancillary equipment for seven of the agency's air route traffic control centers. The automation equipment will provide flight plan data automatically at controller positions and permit controllers to update this information.

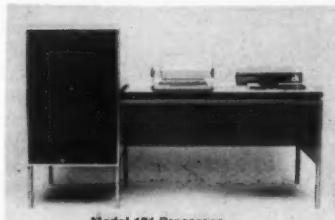
**Datacraft Corp.**, Ft. Lauderdale, Fla., signed with **Conductron-Missouri Division of Conductron Corp.** for three DC 6024 digital computer systems valued in excess of \$500,000. The computer systems will be incorporated into the Conductron-built pilot training simulators for the Ling-Temco-Vought A-7D attack aircraft.

**Computing and Software, Inc.**, of Los Angeles, has received an estimated \$600,000 facilities management contract with **Systematic Services of Calif., Inc.**, Oakland. The corporation will provide complete data processing services for Systematic's customers.

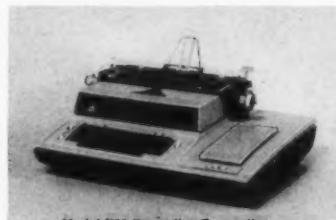
**Commonwealth Computing, Inc.**, of Lexington, Mass., has signed a contract with Georgetown University under which Adpac will be used in the data processing systems of the University. Commonwealth Computing markets Adpac in the eastern U.S. for its developer, a California-based firm.

A \$995,000 contract for digital data link equipment has been awarded to **Raytheon Co.** by **Northrop Corp.**, Los Angeles. The equipment will be used in the U.S. Navy's joint inflight data transmission system, a microwave data link system used to relay reconnaissance data from a variety of electronic sensors used in aircraft to central surface analysis centers.

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## Richburg Named President, Will Build Technical Capabilities of CSC, Ltd.

TORONTO, Ontario — Welton M. Richburg has been appointed president of Computer Sciences Canada, Ltd.

The computer services organization operates nationwide, and maintains facilities in Ottawa, Montreal, Edmonton, Calgary, and Vancouver.

In his new capacity Richburg will direct the further buildup of the company's national organization and the expansion of its

technical capabilities in information systems.

Prior to his new appointment, Richburg was associated with Honeywell Corp. for almost 10 years.

In his most recent Honeywell assignment, Richburg was a regional director in the company's EDP Division. In that capacity, he directed the activities of 450 systems engineers and marketing personnel based at 22 offices throughout his territory.

Earlier, he served in a number of management, marketing and technical positions in Honeywell's EDP Division and its Federal Systems Division.

Computer Sciences Canada provides industry and government with systems analysis and design, systems engineering, computer programming, and related services in the development and operation of information systems.

COMPUTERWORLD



## EDPeople

## Douglas Named President Of Information Systems

SAN FRANCISCO — Gordon R. Douglas has been appointed president of Information Systems Management Corp. of Richland, Washington.

ISM is a Western Operations subsidiary which designs and develops data management systems that automate the tasks of computer systems design, program design, coding, and testing.

Douglas replaces D.C. McElroy who recently resigned to serve as an independent consultant to both ISM and Western Operations.

Prior to his new appointment, Douglas was vice-president of management planning for Western Operations, where he managed its large-scale system development and installation project for the Federal National Mortgage Association.

Earlier, Douglas served as management consultant with Touche, Ross, Bailey & Smart and with Cresap, McCormick and Paget, Inc. He began his 10-year career in data processing as marketing representative for IBM.

Douglas is a graduate of the University of Washington with a B.S. in business administration, and has taken post-graduate work in accounting and statistics at the University of California.

## Elgin Division Names President

NEW YORK — Frank F. Schmeyer has been named president of Elgin National Data Services, Inc., a subsidiary of Elgin National Industries, Inc.

Schmeyer has been with the company for over a year.

Previously, he was director of information services for the Thayer-Knomark Division of Revlon, Inc. where he was responsible for all data services. He had also served in a managerial data processing position with the Chase Manhattan Bank, the New York Central Railroad, and Lever Brothers.

He is a graduate of Hofstra University with a major in management-marketing. He has done graduate work at New York and Harvard Universities and presently holds an Assistant Professorship at Adelphi University.

## DeLair Heads Transdata Corp.

PHOENIX, Ariz. — William E. DeLair Jr. has been elected president of Transdata Corp.

Transdata is headquartered at 4808 North Central Avenue and provides on-line computer services to firms in Phoenix and Tucson, Arizona; and Las Vegas.

Prior to his appointment as president, DeLair had served as executive vice-president of Transdata.

He had held various management and engineering positions with General Electric and IBM before joining Transdata in 1968.

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## Position Announcements

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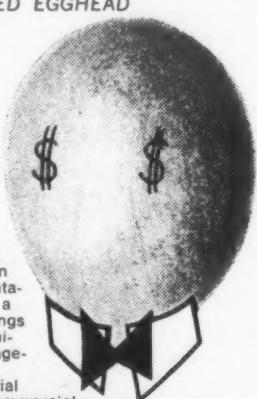
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## Sassenfeld Joins Tymshare Inc. as VP

PALO ALTO, Calif. — Dr. Helmut M. Sassenfeld has joined Tymshare, Inc. as vice-president and general manager of the company's Technical Division.

Sassenfeld, a nationally renowned scientist and lecturer on computer programming and applications, will be responsible for directing the technical support of Tymshare's international time-sharing services. Tymshare is a large independent time-sharing company, serving subscribers in the U.S., Canada, and western Europe.

Prior to joining Tymshare, Sassenfeld was vice-president of operations for Applied Logic, a time-sharing company. He has also served as manager of control systems for RCA where he was responsible for that company's entry into time-sharing and especially for the development of the Spectra 70/46 time-sharing system.

Sassenfeld served eight years as general manager of information processing for General Electric and was head of NASA's computation laboratory in Huntsville, Ala.

A Ph.D. in mathematics from Darmstadt Institute of Technology in Germany, Sassenfeld has spent 22 years in the field of computer sciences. He has

taught graduate courses in mathematics at Darmstadt Institute and the University of Alabama. He received research fellowships from Columbia University and the German Research Foundation.

### Branch Named President Of Data Decisions Corp.

NEW YORK — Jack H. Branch has been elected president and director of Data Decisions Corp.

Branch was manager of computer systems for RCA Global Communications, Inc. Among his various activities there, he implemented the computer telegraph and Aircon systems which were the first to utilize computer-controlled communications commercially.

### Executive Corner

Under Branch's direction, Data Decisions plans to institute a new consultation service for the use of computers in conjunction with world-wide communications and to provide total computer systems on a turn-key basis for the control of communications environments. At present, the company offers a complete line of data processing programming and time sales services.

Branch served as site manager at Andrews Air Force Base during the implementation phase of the Autodin project, the world's largest real-time computerized communications system.

His prior affiliation was with Philco Corp. as a project engineer for computer planning. Earlier he worked on the electronic packaging of the Atlas and Titan airborne digital com-

puter system at American Bosch Arma Corp.

### Cambridge Computer Corp. Promotes Two Officers

NEW YORK — Cambridge Computer Corp. has named John M. Kehoe executive vice-president and Dickson L. Barnhart vice-president, corporate planning.

In his new position, Kehoe will be responsible for all technical systems and marketing for Cambridge Computer Corp. He will continue as president of Cambridge Computer Corp. of New York, a wholly owned subsidiary of the company.

Barnhart will be responsible for company-wide organization, marketing strategy and planning, mergers, and acquisitions.

Both executives were with IBM for ten years; Kehoe in marketing and administration and Barnhart in marketing.

Cambridge Computer Corp. provides facility management and related services to a wide range of industries. Facility management is the design implementation, operation, and management of clients' data processing facilities.

### Other Moves

■ Computer Mechanisms Corp., Carlstadt, N.J., has named Donald G. Demmert vice-president of manufacturing.

■ Cadcom, Inc. of Annapolis, Md., has appointed Dr. Charles O. Heller president. The company has also appointed John E. Cusack Jr. as executive vice-president, Edward C. Grant as marketing manager, and Frederick A. Klappenberger as manager of computer sciences.

■ Lloyd Murray has been promoted to manager, service engineering for Applied Logic Corp., Princeton, N.J. His new duties will include responsibility for preventive and corrective maintenance on all Applied Logic's in-house computers and related equipment.

(Continued on Page 39)

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## Fletcher Named Manager Of Electronic Memories

HAWTHORNE, Calif. — Royce W. Fletcher has been named general manager-magnetic materials products for Electronic Memories, a Division of Electronic Memories and Magnetics Corp.

Fletcher will be responsible for product planning, development, and marketing for Electronic Memories core products, and will also be responsible for broadening EM's core customer base. This is a newly created position, part of Electronic Memories' broad program of capabilities-expansion aimed at meeting the rapidly growing needs of the data processing

industry for the company's line of memory systems. Electronic Memories' field sales force, with offices in major cities, will continue to handle memory systems, as well as the division's other products.

Fletcher assumes this position after having previously served the company as a product marketing manager and a program manager-commercial products.

Prior to joining Electronic Memories in April of 1968, Fletcher was manager-memory applications for the Computer Control Division of Honeywell, and was earlier an associate engineer for IBM.

### Executive Corner

(Continued from Page 38)

■ Harry R. Colgate has been named vice-president and general manager of the products division of Data Trends, Inc., Parsippany, N.J.

■ Francis J. Honey has been elected vice-president of engineering of Computer Image Corp., Denver, Colo.

■ Robert J. Semlitsch has been named manager of the Buffalo computer center of Marine Midland Services Corp., Buffalo, N.Y.

■ Mohawk Data Sciences Corp. of New York has appointed Joe Crabtree vice-president, corporate systems and controls.

■ Lawrence M. Breed, who led the development of the computer programming language called APL while he was at IBM's Thomas J. Watson Research Laboratory, has been elected vice-president, development of Scientific Time Sharing Corp., Washington, D.C. He will head a team that is developing APL facilities for large input/output files to extend the use of the new language for information retrieval applications.

■ Alan L. Kahn has been appointed vice-president and director of human resources for Kearfott Division, Singer-General Precision, Inc., Little Falls, N.J.

■ Herbert D. Cornell has been appointed vice-president of computer education for Computer Environments Corp., Hanover, N.H.

■ Arnold E. Rose has been appointed vice-president and technical director of Computer Data Enterprises, Inc., Jenkintown, Pa.

■ John F. Blake has been named vice-president of marketing for International Time-sharing Corp., Minneapolis.

■ Advanced Computer Systems, Inc., Jenkintown, Pa., has appointed Francis J. Gavin vice-president of marketing.

■ Control Data Corp., Los Angeles, has named R.T. Moore Jr. southeast region manager of EDP sales. As region manager, Moore will direct the sales, marketing, and support activities of the company's sales force in the southwestern U.S.

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## Director Recap

Three new members have been elected to the board of directors of Computer Retrieval Systems, Inc., Bethesda, Md. They are John H. Beidler, Dr. Eugene W. Bold, and Donald E. Jefferson. Beidler is executive director of the Committee for Community Affairs in Washington. Bold and Jefferson are vice-presidents of the corporation.

Dr. William F. Pounds, dean of the Sloan School of Management at M.I.T., has been elected to the board of directors of the Grumman Data Systems Corp., Bethpage, N.Y. Grumman Data Systems provides government and commercial customers with computer and data processing services.

Leasepac Corp., Cleveland, Ohio, has appointed Maurice Saltzman a director.

William H. Osborn Jr., a partner of Lehman Brothers, an investment banking firm, has been elected to the board of directors of Sanders Associates, Inc. of Nashua, N.H.

Robert J. Sims, president of

Fin-Plan, Inc. of Wayne, Pa., a financial service organization, has been elected a member of the board of directors of Advance Data Corp., of Philadelphia. Sims was president of the Philadelphia Junior Chamber of Commerce, and past national director of the U.S. Junior Chamber of Commerce.

Robert F. Gibeau has been elected to the board of directors of Data Group Inc., a systems and data processing organization.

Gibeau is currently executive vice-president of Duncan Ceramic Products, Inc. but will be leaving that company's employment on Jan. 1, 1970, to reactivate his previous management consulting practice, R.F. Gibeau and Associates. He will continue as a consultant to Duncan Ceramics.

Dr. Bertram Herzog, professor of industrial engineering at the University of Michigan, has been elected director of Information Displays, Inc., specialists in interactive computer-controlled graphic display systems.

## Position Announcements

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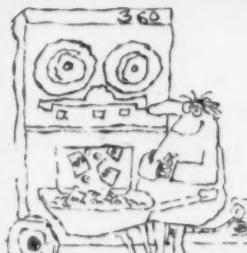
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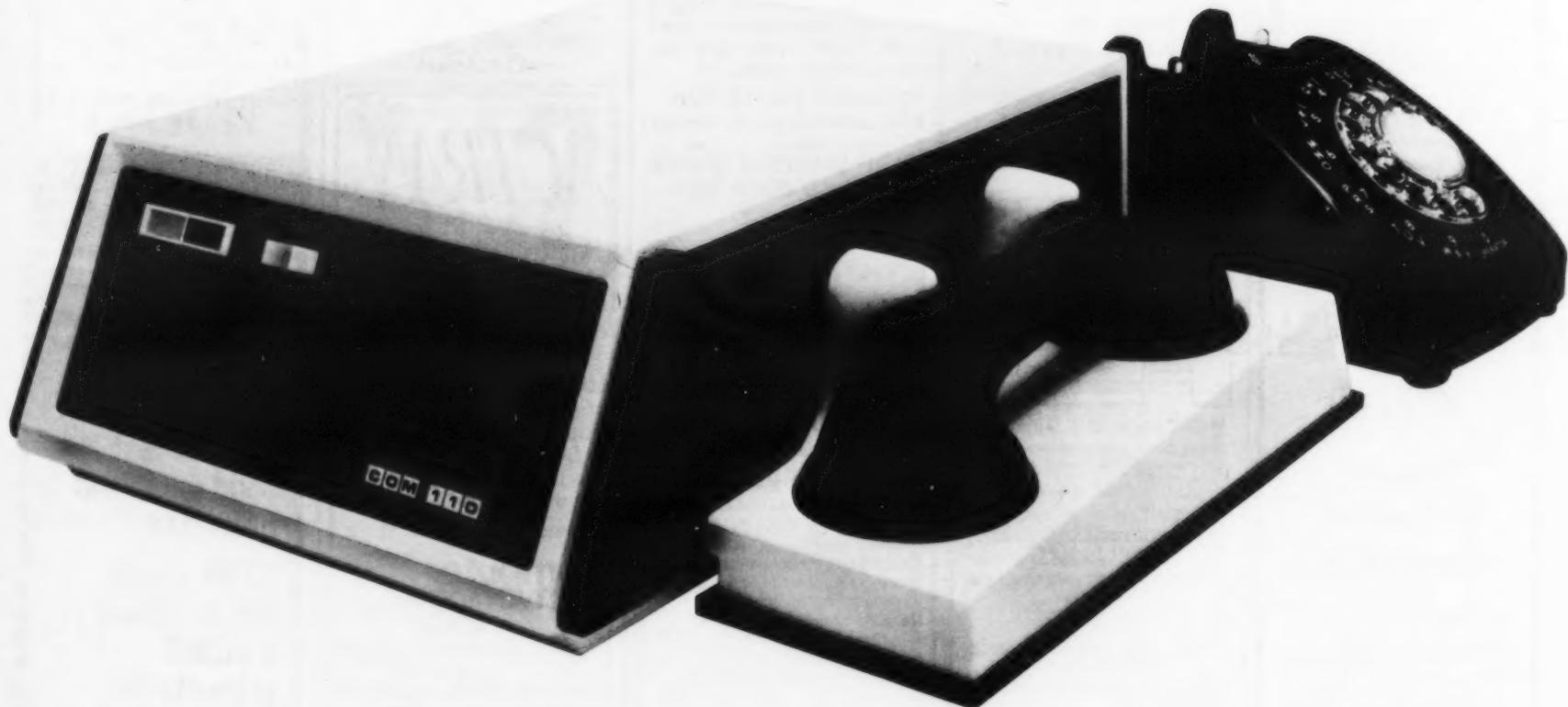
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February 18, 1970

Page 45

# Computing & Software Sets \$31 Million Merger

LOS ANGELES — Pacific Plantronics, Inc., (PPI) will be acquired by Computing and Software Inc.

Under an agreement just announced, Computing and Software will exchange one share of its common stock for each 1.9 shares of Pacific Plantronics common. An official of Computing and Software said the transaction involves the exchange of about 380,000 shares.

If the value of the C&S shares exceeds \$31 million on the date PPI shareholders meet to vote on

the merger, the number of C&S shares will probably be reduced to a value equal to \$31 million.

Headquartered in Santa Cruz, Calif., Pacific Plantronics manufactures voice and data communication equipment. It was founded in May, 1961.

Subject to preparation of a definitive agreement, the transaction, already approved by PPI's board of directors, also requires approval by Pacific Plantronics shareholders, Computing and Software's board of directors, and appropriate reg-

ulatory agencies. It is anticipated that the acquisition will be completed within the next 90 days.

"We plan to utilize PPI's technical capabilities in our eventual development of a nationwide computerized information network," Computing and Software President Norman E. Friedmann stated. "At the present time we are evaluating alternate approaches to the solution of complex information processing needs which exist within our corporation and to satisfy the demands of our national clients."

Pacific Plantronics, under the continued management of Courtney Graham, president, will become a subsidiary of Computing and Software. For the six months ending Nov. 30, 1969, the company reported earnings of 67 cents per share on sales of \$5,020,492. Net income for the period was \$483,024.

PPI manufactures voice communication equipment for telephone companies, airlines, the National Aeronautics and Space Administration, and other national clients. A subsidiary produces teletypewriter line and message switching systems, and other related solid state data transmission products for international record carriers, governmental agencies, and for other major communications companies.

"We envision combining our

communication hardware capabilities," Graham said, "with Computing and Software's data processing expertise to develop a total information handling system."

Computing and Software, manages and operates computing centers and develops applications in the field of specialized information exchanges. The firm also engages in computer software development, sale of computer-related marketing services, data processing training courses, financial services, and manufacturers components for the computer peripheral equipment market.

For the year ending Oct. 31, 1969, Computing and Software reported record earnings of \$1.11 per share on sales of \$64,420,000. Net income for the year was \$4,155,000.

## Ousted Computer Technology President Refuses to Quit, Seeks to Nullify Sale

CHICAGO — G.W. Woerner, director, shareholder, and former president of Computer Technology, Inc., won't go.

Computer Technology was recently transferred to the control of University Computing by LTV Aerospace in a complicated deal [CW, Jan. 14]. One of the results of the deal was Woerner's displacement by Douglass M.

Parnell Jr., as Computer Technology president.

In a telegram to the CT board, Woerner demanded that the deal be nullified within 15 days. He charged that "UCC, LTV, Inc., and LTV Aerospace Corp. have conspired and agreed to take actions which have been and will continue to be violative of the antitrust laws and detrimental to

the minority stockholders of CT, Inc."

The telegram added "... actions taken by a majority of the board of directors of CT have violated such directors' fiduciary duty not to dissipate the corporate assets of CT. . . ."

Both CT and UCC denied the factual and legal basis for Woerner's charges and promised to fight any lawsuit that might arise over the issue.

In an interview Woerner stated that he definitely was not resigning.

Woerner demanded that the CT board:

- Nullify the election of new directors.
- Take action to require UCC to divest itself of all its shares of CT.
- Take action to enjoin UCC from acquiring any more of CT and enjoin LTV Aerospace from selling UCC any more of CT.
- Take action to recover damages for antitrust violations.
- Take action against directors who approved the deal for violation of their fiduciary duty.
- Take action against UCC, LTV, and LTV Aerospace for violation of fiduciary duty as controlling shareholders of CT.

## Western Union Hits Highs For '69 Earnings, Revenues

NEW YORK — Net earnings at Western Union Corp., new holding company for Western Union Telegraph Co., have jumped 21% to a record \$22.8 million, or \$2.37 a share, from a restated \$18.8 million in 1968.

Total revenue rose only 7% to \$386.5 million.

The company expects a sharp rise in teleprinter exchange revenue and plans to make majority interest investments in software and time-sharing houses, according to Russell W. McFall, WU chairman and president.

The company also plans to purchase AT&T's TWX system by the end of the year and merge it with its own Telex system.

McFall predicted that WU will set earnings and revenues records again in the coming year, despite a dreary economy.

Other WU projects for the coming year are participation in a domestic satellite communications system and major effort in its joint "mailgram" service with the U.S. Post Office, which the company expects will generate more revenue than its teletype business.

McFall said that WU is interested in companies that have developed either a software computer program or time-sharing business that offers a specific service to customers.

He noted that WU can offer such companies communications expertise to combine with their computer knowledge, as well as financial backing, managerial experience, and the opportunity to expand into a national service.

"I'm talking about acquiring major positions in companies, but leaving enough of the equity with the creative people running them to provide an incentive for growth," McFall said.

The addition of AT&T's TWX system will add about 42,000 customers to WU's 32,000 Telex users. WU will require some outside financing for the estimated \$118 million it will pay for TWX. AT&T has agreed to take 50% of its estimated \$82 million share of the deal in four year WU notes.

According to McFall, WU expects to be able to finance its remaining \$100 million of capital expenditures for this year internally.

Conversion into a holding company has paved the way for WU's entrance into unregulated activities such as service bureau operation.

## Telex Board Favors Five Way Split

TULSA, Okla. — Telex Corp. is splitting its stock five to one, if the stockholders approve.

The board of directors of Telex voted on February 12 to split the stock of the corporation five to one, according to a company spokesman.

A meeting of stockholders has been called for April 14, 1970, to vote on the board's recommendation, he continued.

If the stockholders give their approval, the stock will be distributed to shareholders of record as of April 17, 1969 on May 1.

While revenues for the firm rose 11%, Honeywell reported that earnings increased 24% to \$62.5 million or \$4.15 per share, from \$50.5 million or \$3.41 per share in 1968. Unaudited fourth-quarter earnings were \$22.7 million compared to \$20.0 million a year earlier.

Honeywell Board Chairman James H. Binger noted "We expect our computer and communications segment alone to gross \$1 billion by 1975."

While revenues for the firm rose 11%, Honeywell reported that earnings increased 24% to \$62.5 million or \$4.15 per share, from \$50.5 million or \$3.41 per share in 1968. Unaudited fourth-quarter earnings were \$22.7 million compared to \$20.0 million a year earlier.

By Drake Lundell  
CW New York Bureau

NEW YORK — Honeywell's computer and communications revenues rose 32.5% to \$35 million, in the year ended Dec. 31, pacing the firm to record worldwide sales of \$1.4 billion, an 11% increase over the 1968 revenues of \$1.3 billion.

Honeywell Board Chairman James H. Binger noted "We expect our computer and communications segment alone to gross \$1 billion by 1975."

While revenues for the firm rose 11%, Honeywell reported that earnings increased 24% to \$62.5 million or \$4.15 per share, from \$50.5 million or \$3.41 per share in 1968. Unaudited fourth-quarter earnings were \$22.7 million compared to \$20.0 million a year earlier.

## CTC Computer Refutes American Micro Lawsuit

PALO ALTO, Calif. — CTC Computer Corp. has denied all allegations made in a suit filed in San Jose by American Micro-Systems, Inc. CTC, Palo Alto-based computer systems firm, is one of several defendants named in the complaint.

American Micro-Systems charged in the suit that CTC, through its financial interests in a new company called International Computer Modules, Inc., was a part of a conspiracy which could cause AMI "great and irreparable harm."

International Computer Modules, Inc., is a new company formed to manufacture MOS devices for the computer industry. Four employees of ICM were formerly employed by American Micro-Systems. In the suit, AMI charges that the employees, and CTC by its financial backing, "recruited other AMI employees," and "gave instructions to gather and make copies of

AMI confidential and proprietary information for the use of the defendants," among other charges.

William R. Conklin, general counsel for CTC, said his company was not involved in any conspiracy to obtain trade secrets from AMI, and in fact had no interest in them. "The MOS technology is changing so rapidly, that by the time International Computer Modules is ready to go into production, about a year from now, AMI's present techniques will probably be obsolete."

Conklin also denied that CTC was involved in recruiting AMI employees to join ICM. "The founders of International Computer Modules came to us seeking financial backing. They had talked with other people before they met with CTC, and the nucleus of their company was already formed before we had any involvement with them."

## Honeywell EDP Net Climbs 33%

Binger, who said that the Honeywell computer and communication growth rate was ahead of the rest of the industry, disclosed that at year end 1969 the value at sales price of installed equipment was about \$1.5 billion, up 33% from the end of 1968.

He said that about \$900 million of the installed-equipment figure represented the value of equipment on rental, up 28% from a year ago. Rental and maintenance revenue from computers in 1969 was up 29%, he added.

While Honeywell does not break down earnings by separate divisions, Binger reported: "Domestic computer operations have been profitable for four years and overseas operations for two. We expect the trends of rapid growth and improved pro-

fitability to continue in the year ahead."

Stephen F. Keating, Honeywell president added that the compound annual growth rate for the computer and communications segment of the firm's business from 1965 through 1969 was 35%. He also said that the business has moved from "a heavy loss in 1965 to a continuing strong profitability in 1969."

However, Keating told the group that pre-tax margins for the computer and communications group as a whole "are not yet up to the company overall average," even though "they are now approaching this level."

In addition, Honeywell is currently devoting more than half of its \$142 million research and development budget to computer related projects.

**Mini Review III**

# Honeywell's Computer Control: On Being Number Two

By Michael Merritt  
CW Staff Writer

The question is, does number two really try harder?

Through its Computer Control Division, Honeywell is the second largest manufacturer of minicomputers. One respected market survey puts Honeywell's share of 1969 shipments at 8%, well under DEC's 32%, and just edging out Hewlett-Packard, Varian, and Interdata, all at 7%.

These figures were compiled late last fall, and their absolute value is difficult to determine in the highly volatile mini market; in addition, sales figures are treated as proprietary information by manufacturers, and any

market survey is a rough thing at best. We can see though that behind DEC is the pack, and one of its leaders right now is Honeywell.

Honeywell entered the mini field in May, 1966 with the acquisition of Computer Control Co., which became the Computer Control Division. As mini makers go it's an old timer. It produced its first computer in 1960 and its first mini in 1965 when it unveiled the DDP-(Digital Data Processor) 116, the granddaddy of the current successful 16 line.

Unlike DEC, Honeywell has staunchly supported the 16-bit word machine, straying from it

only with the H-21, a machine developed not by the CCD, but by the Honeywell Industrial Division for industrial control and later transferred to the CCD for administrative purposes.

The 16 line now has three members, the H 316, 416, and 516, in order of increasing price and size.

The 316 is really a minimal mini, more suited for industrial control, communications switching, and data acquisition than general purpose computing. One of the reasons for this is an instruction repertoire that, while extensive, has some glaring holes in the range of jump instructions, a fault that requires a

programmer to generate some very wasteful code in compensation.

The 316 sells, in minimal configuration, for \$9,700, however, and does accept a large software library, as do all of Honeywell's 16s. There is a question, though, of how much of the computing burden should lie on a tricky software library to make up for hardware limitations.

The basic memory size of the 316 is 4,096 words, expandable in those increments to 16,384 words. Cycle time is 1.66  $\mu$ sec, and add time is 3.2  $\mu$ sec.

The next step up is the 416, with the same memory configuration, but a cycle time of

960 nsec and an add time of 1.92  $\mu$ sec. The 516 has the same speed and basic memory size, but can be expanded to 32,768 words. Minimum price for the 416 is \$15,700 and the 516 \$23,800.

The 516 has a repertoire of 72 instructions, larger than the 416. According to Honeywell, all the 16 series are program compatible.

One of the reasons for DEC's dominance of the market is its ability to provide a user with a solution to a problem, rather than just a minicomputer. This involves necessary peripherals, interfacing, software, and applications packages. Honeywell is somewhat behind in offering all these, but there are indications that they are doing their best to catch up.

In terms of software, Honeywell has an extensive library of math subroutines, and they boast of "more than 500 . . . packages . . . including hundreds of applications programs . . ." developed by previous users of the 16 series.

As with the PDP-8, there is a 16 series users group.

All the machines will accept a Fortran IV compiler as well as DAP-16, an assembly language for the 16 series, Exec-16, an executive control package, and a disk operating program. The 16s also accept a number of support, debugging, testing, and I/O programs.

Peripherals have been a weak point at Computer Control, and the group is just beginning to fill out its product line. Last month CCD revealed that it would begin delivering late this spring three new moving head disk drives, four different printers, a magnetic tape drive, and a data acquisition and control subsystem.

According to a company spokesman, Honeywell has plans for more new product announcements soon. As it stands now, they have a full line of general application peripherals, though a prospective user will have to turn elsewhere for more esoteric units, which of course means difficult interfacing problems.

Naturally, Honeywell describes user reaction as enthusiastic. While the 316 is used most often in dedicated situations, the 416, and in particular the large 516, are especially strong in time-sharing applications. About 50% of CCD's non-OEM sales are for time-sharing purposes.

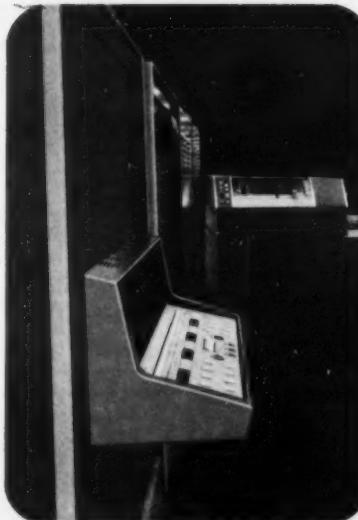
Two months ago, CCD revealed it was tooling up for a 50% increase in sales for the coming year. So far 16 series machines are located in over 500 installations, and though, like all manufacturers, CCD is chary about releasing sales figures, it is estimated that they have sold over 2,500 of the machines.

The competition is coming from the PDP-8/I and 8/L, Varian's 620i, the Hewlett-Packard 2114B and 2116B, the XDS Sigma 2, and Data General's Nova and Super Nova, a roster of the hottest machines in the field.

We'll take a look at more of this roster next time.

## Datacraft's Master Plan:

organize  
the world  
24 bits  
at a time!



Datacraft is now delivering the fastest 24-bit general purpose Digital Computer available today. Our DC 6024 overshadows many 32-bit machines that limp along behind fancy gingerbread control panels. We take advantage of the simplicity of our 24-bit CPU design and our superspeed memory to run circles around several of our larger cousins, both price-wise and throughput-wise.

Datacraft's DC 6024 is the computer with 600 NSEC full cycle time. This is the processor with 120 generic types of hard-wired

instructions and more than 500 operation codes. Ours is the CPU that can give you up to 72 levels of priority interrupt and the capa-

bility to handle up to 448 different I/O units. With a transfer rate of 40 bits per microsecond, you'll be kept plenty busy feeding our DC 6024.

Datacraft is in full production of DC 6024 Digital Computers, and your deliveries can begin 60 days from date of order. Price for the basic unit, without main frame options, is \$53,900.

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(24 bits at a time).*

*Tomorrow Someplace Else  
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## Earnings Reports

### AMP INC.

Year Ended Dec. 31  
 a1969 1968  
 Shr Ernd \$1.98 \$1.33  
 Revenue 211,200,000 167,172,000  
 Earnings 24,275,000 16,277,000

a-Preliminary.

### BRANDON APPLIED SYSTEMS

Nine Months Ended Nov. 30

1969 1968  
 Shr Ernd ..... \$0.04  
 Revenue 3,289,647 1,897,850  
 Loss 87,810 a32,064  
 Spec Chg b22,910 .....  
 Loss 110,720 a32,064

a-Income; b-Losses from aborted investments less income tax credits of \$6,090.

### BRADFORD COMPUTER & SYS

Year Ended Dec. 31

a1969 1968  
 bShr Ernd \$.39 .....  
 Revenue 4,570,000 .....  
 Earnings 537,000, .....

a-Preliminary; b-On a fully diluted basis. Company commenced operations on Feb. 1, 1968. For the 11 months ended Dec. 31, 1968, the company had net income of \$5,139 on revenues of \$905,000.

### CONTROL DATA CORP.

Year Ended Dec. 31

a1969 b1968  
 Shr Ernd c\$3.11 \$2.99  
 Spec Cred d6,300,000 .....  
 Earnings e52,600,000 44,100,000

a-Preliminary; b-Restated to include acquisitions on a pooling-of-interests basis; c-Based on income before special credit; d-Consists of \$3,500,000, or 24 cents a share, from the sale of certain manufacturing subsidiaries of Commercial Credit Co., and \$2,800,000, or 20 cents a share, principally from tax loss carry-forward of some Control Data international subsidiaries; c-Includes net income of Commercial Credit Co. of \$31,200,000 in 1969 and \$25,800,000 in 1968; e-Equal to \$3.55 a share.

### DATA PACKAGING CORP.

Year Ended Nov. 29

1969 1968  
 aShr Ernd \$.77 \$29  
 Revenue 15,282,628 7,779,925  
 Earnings 1,208,389 439,151

### DATA DOCUMENTS INC.

Three Months Ended Dec. 31

1969 1968  
 aShr Ernd \$.45 \$40  
 Revenue 5,890,795 5,059,521  
 Spec Cred ..... b13,894  
 Earnings 212,874 c202,098

a-Based on income before special credit; b-Income tax benefit arising from operating loss carryforward; c-Equal to 43 cents a share.

### LVO CORP.

Six Months Ended Nov. 30

a1969 b1968  
 cShr Ernd \$.08 \$0.8

Revenue 13,459,000 9,831,000  
 Spec Cred 487,000 1,675,000

eEarnings 1,011,000 2,161,000

a-Includes five months operations of Scott Rice Co., acquired in July, 1969; b-Restated to reflect merger with VA-CO-HY Business Forms Inc., in January, 1969; c-Based on income before special credit; d-From tax loss carryforward in 1969 and from tax loss carryforward and gain on sale of two CATV systems in 1968; e-Equal to 16 cents a share in 1969 and 37 cents a share in 1968.

### RAYTHEON CO.

Year Ended Dec. 31

1969 a1968  
 Shr Ernd \$2.35 b\$2.12  
 Rev 1,285,134,000 1,196,507,000  
 Spec Chg ..... c1,276,000

Earnings 7,996,000 d30,444,000

3 Mo Shr .53 .50

Revenue 335,945,000 310,766,000

Earnings 7,996,000 7,583,000

a-Restated by company; b-Based on income before special charge; c-From discontinuance of operations of an Italian subsidiary; d-Equal to \$2.03 a share.

# Computerworld Stock Trading Summary

NEW YORK AND AMERICAN STOCK EXCHANGE CLOSING PRICES, FRIDAY, FEBRUARY 13;  
 OVER THE COUNTER, THURSDAY, FEBRUARY 12

COMPUTER SYSTEMS				WEEK	WEEK	PERIPHERALS & SUBSYSTEMS				WEEK	WEEK				
EXCH	RANGE	CLOSING	PRICE	NET	%	EXCH	RANGE	CLOSING	PRICE	NET	%				
A	36- 10	10	3/4	ASTRODATA	- 4	7/8	- 31.38	N	85- 47	51	1/8	ADDRESSOGRAPH-MULT	+ 2	+ 4.07	
N	172-120	154	1/2	BURROUGHS CORP	+ 1	1/2	+ 0.32	O	71- 10	13	3/4	ALPHANUMERIC	+ 1/4	+ 1.85	
N	69- 23	23	1/4	COLLINS RADIO	- 2	3/8	- 9.27	O	49- 32	41	1/8	AMPEX CORP	+ 1/4	+ 0.61	
N	159- 60	66	1/4	CONTROL DATA CORP	- 2	3/4	- 3.99	O	19- 8	9	1/2	BOLT, BERANEK & NEW	---	---	
A	124- 54	121	7/8	DIGITAL EQUIPMENT	+ 7	7/8	+ 6.91	N	17- 9	13	1/8	BUNKER-RAMO	- 1/4	- 1.89	
N	25- 8	8	8	ELECTRONIC ASSOC.	- 3/8	-	- 4.48	A	37- 18	28	3/8	CALCOMP	+ 3	1/8	+ 12.38
A	28- 10	12	12	ELECTRONIC ENGINEER.	+ 5/8	+ 5.49	N	38- 11	11	3/4	COGNITRONICS	- 1/4	- 2.08		
N	45- 25	34	5/8	FOXBORO	+ 7/8	+ 2.59	O	48- 27	27	1/2	COMPUTER COMMUN.	- 1/2	- 1.82		
N	98- 68	68	7/8	GENERAL ELECTRIC	- 1	1/4	- 1.78	A	16- 7	9	1/2	COMPUTER EQUIPMENT	- 1/8	- 1.30	
N	114- 75	101	1/4	HEWLETT-PACKARD CO	+ 1	1/2	+ 0.50	O	27- 12	20	3/4	DATA PRODUCTS CORP	- 1	1/4	- 5.68
N	207- 57	134	1/2	HONEYWELL INC	- 2	1/2	- 0.37	A	22- 12	12	1/2	DIGITRONICS	- 1/2	- 3.85	
N	387- 291	349	IBM	+ 4	1/4	+ 1.23	O	43- 31	37	1/2	ELECTRONIC M & M	+ 1	1/4	+ 3.50	
N	171-108	146	1/2	NCR	+ 4	-	+ 2.81	A	89- 59	76	7/8	FABRI-TEK	---	---	
N	48- 29	29	7/8	RCA	- 1	1/2	- 1.65	O	31- 10	11	1/2	FARRINGTON MFG	+ 1/2	+ 3.70	
N	50- 26	27	3/4	RAYTHEON CO	- 1	3/4	- 5.93	O	42- 18	18	1/2	INFORMATION DIS	- 1/4	- 1.52	
O	43- 1	7	7	SCI. CONTROL CORP.	- 1	-	- 12.50	O	21- 10	16	1/4	MARSHALL INDUSTRIES	+ 3	7/8	+ 7.89
N	55- 34	34	1/2	SPERRY RAND	- 1	5/8	- 4.50	A	82- 15	53	1/2	MILGO ELECTRONICS	+ 1	1/4	+ 1.78
A	53- 26	43	1/4	SYSTEMS ENG. LABS	- 1/4	-	- 0.57	O	84- 17	71	1/2	MOHAWK DATA SCI.	+ 5/8	+ 0.82	
N	37- 22	25	7/8	VARIAN ASSOCIATES	+ 5/8	+ 2.48	N	118- 40	46	1/2	OPTICAL SCANNING	+ 3	-	+ 6.98	
A	61- 36	43	43	WANG LABS.	+ 1	1/4	+ 2.99	A	46- 23	35	3/8	POTTER INSTRUMENT	+ 2	3/8	+ 7.20
SUPPLIES & ACCESSORIES															
'69-'70 CLOSING				WEEK	WEEK	SUPPLIES & ACCESSORIES				WEEK	WEEK				
EXCH	RANGE	PRICE	CHANGE	NET	%	EXCH	RANGE	PRICE	CHANGE	NET	%				
O	47- 31	39	ACME VISIBLE	+ 1	-	+ 2.63	O	82- 54	71	1/2	RECOGNITION EQUIP	+ 3	-	+ 4.38	
N	22- 11	12	7/8	ADAMS-MILLIS CORP	+ 1	-	+ 8.42	N	61- 20	20	1/8	SANDERS ASSOCIATES	- 1	5/8	- 7.47
O	27- 15	16	BALTIMORE BUS FORM	- 2	-	- 11.11	O	85- 28	37	1/2	SCAN DATA	+ 3	-	+ 8.82	
A	29- 15	15	7/8	BARRY WRIGHT	- 2	1/8	- 11.81	N	115- 85	97	3/4	VIATRON	+ 6	-	+ 16.90
O	44- 26	34	DATA DOCUMENTS	+ 4	-	+ 13.33	O	118- 40	46	1/2	XEROX CORP	- 4	7/8	- 4.75	
LEASING COMPANIES															
'69-'70 CLOSING				WEEK	WEEK	LEASING COMPANIES				WEEK	WEEK				
EXCH	RANGE	PRICE	CHANGE	NET	%	EXCH	RANGE	PRICE	CHANGE	NET	%				
O	14- 6	6	7/8	BANISTER CONTIN	- 1/8	-	- 1.79	O	14- 4	5	1/2	ADVANCED COMP TECH	---	---	
O	45- 20	20	3/4	BOO THE COMPUTER	- 3/4	-	- 3.49	A	32- 17	17	1/2	APPLIED DATA RES.	- 1	1/2	- 7.89
O	18- 4	9	9	COMPUTER EXCHANGE	+ 2	3/4	+ 44.00	O	19- 3	4	1/2	ARIES	+ 1/8	-	+ 2.86
O	34- 10	11	3/4	COMPUTER LEASING	+ 1	3/4	+ 17.50	A	47- 34	45	3/8	AUTOMATIC DATA PRC	+ 2	-	+ 4.61
O	15- 7	13	13	CYBER-TRONICS	- 1/4	-	- 1.89	O	16- 7	12	1/4	AUTO SCIENCES	- 1/4	-	- 2.00
A	60- 22	22	7/8	DATA PROC. F & G	- 3/8	-	- 1.61	O	17- 5	6	1/2	BRANDON APPL SYS	- 1/2	-	- 7.14
O	16- 2	7	1/4	DATRONIC RENTAL	- 1/4	-	- 3.33	O	21- 6	8	1/8	COMPUTER APPL	+ 1/8	-	+ 1.56
A	52- 19	21	3/4	DEARBORN COMPUTER	+ 1/2	-	+ 2.35	O	16- 6	12	1/4	COMPUTER ENVIRON	- 1/4	-	- 2.00
A	15- 7	7	3/4	DPA, INC.	- 1/8	-	- 1.59	O	47- 10	11	1/4	COMPUTER NETWORK	+ 1/2	-	+ 4.65
A	45- 14	16	1/8	GRANITE MGT	- 3/8	-	- 2.27	O	34- 19	24	3/8	COMPUTER SCIENCES	- 3	7/8	- 13.72
A	28- 11	11	5/8	GREYHOUND COMPUTER	- 1/8	-	- 1.06	O	40- 5	7	1/4	COMPUTER USAGE	+ 1/2	-	+ 7.41
N	54- 19	19	1/2	LEASCO DATA PROC.	- 1	5/8	- 7.69	O	75- 37	68	1/2	COMPUTING & SOFT	- 3/4	-	- 1.08
O	9- 4	4	7/8	LECTRO COMP LEAS	---	-	-	O	24- 3	5	1/2	DATAMATION SERVICE	+ 1/8	-	+ 2.56
A	57- 10	11	1/8	LEVIN-TOWNSEND CMP	- 2	1/8	- 16.04	O	17- 5	6	1/2	DATATAB	- 1/4	-	+ 3.70
O	8- 1	2	5/8	LMC DATA, INC.	- 1/8	-	- 4.55	O	15- 2	3	1/8	DIGITEK	+ 1/8	-	

